

# Impact of quality, procurement and production in grocery industry

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<p>Abstract</p> <p>A wide basis of theory was gathered to support the research part during the whole thesis process. Some of the theory was necessary to leave off from the research part, but it will give a good base for Saarioinen in the future, if the company decides to take it in use. In the research part some topics were outlined, as mentioned above, because of the time limits and wideness of the work.</p> <p>Supply chain management, quality management and production based issues formed the most important subject during the research. From all of the topics, several notations was made and two improvement ideas and two ideas for further research was brought up. Reforming of storages turned up to be very essential, because it affects to Saarioinen material flows and the present model will increase working hours on a weekly basis. Bar code technique was suggested to begin from the front end of the factory. It would decrease the working hours weekly and also working time every day, because of the automation of certain functions. Further research ideas will be left to the judgement of Saarioinen personnel. Those ideas are certainly not ready, but they may turn to be useful ones if some time and energy will be spend to investigate them.</p> <p>Few calculations came up in the thesis and they will support the improvement ideas. It can be seen from the layouts that reforming of storages would be a good solution for the company. It would bring more efficiency in production. The layouts are in the attachments, because they are not allowed to show in public. This thesis gives a good base for the improvement ideas and for the further research.</p>		
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<p>Tiivistelmä</p> <p>Opinnäytetyössä kerättiin laaja teoriapohja tukemaan tutkimusvaiheen prosessia. Osa teoriasta jouduttiin jättämään tutkimusosan ulkopuolelle sen laajuuden takia, mutta turhaa työtä ei tehty, koska Saarioisella on jatkossa mahdollisuus hyödyntää teoriapohjaa omiin tarkoituksiinsa mikäli sen parhaaksi katsovat. Itse tutkimusosassa aiheet pyrittiin sitten rajaamaan, kuten yllä mainittu, ajan puitteissa sillä tavalla, että toimintojen kannalta tärkeimmät olisivat olleet käsittelyssä.</p> <p>Hankintaketjun hallinta, laadunhallinta ja tuotannolliset seikat muodostuivat keskeisimmiksi asioiksi tutkimuksen kannalta. Näiden edellä mainittujen aiheiden kautta syntyi erinäisiä huomioita Saarioisten toimintaan liittyen, sekä kaksi kehitysehdotusta ja kaksi jatkokehitysehdotusta. Varastoinnin uusiminen osoittautui jopa erittäin oleelliseksi seikaksi, sen vaikutusalueen takia, jotka ulottuvat materiaalivirtojen kulusta jopa ylimääräisiin työtunteihin viikoittain. Viivakooditeknikkaa ehdotettiin alkamaan tehtaan toimintojen alkupäästä, jonka kautta pystyttäisiin vähentämään työntekijöiden työtä automatisoitujen ratkaisujen kautta. Jatkokehitysehdotuksen taas tulevat olemaan Saarioisten henkilöstön mietittävässä. Ne eivät missään tapauksessa ole valmiita ideoita, mutta lisätutkinnalla niistä voisi tulla tulevaisuudessa hyötyä Saarioisten toimintoihin.</p> <p>Opinnäytetyössä tuli esille muutamia laskelmia, jotka antoivat tukea muutosehdotuksille. Myös varastoinnin uudelleen asettelu toisi tuotantotehokkuutta firmalla, kuten pohjapiirroksista voidaan nähdä. Pohjapiirrokset ovat liitteenä työssä, koska ne ovat salaista materiaalia, joten niitä ei voida antaa julkiseen käyttöön. Opinnäytetyötä voidaan käyttää perustana kehitysideoille sekä jatkotutkimukselle.</p>		
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# CONTENTS

<b>1</b>	<b>BASIS FOR THE FINAL THESIS .....</b>	<b>3</b>
<b>2</b>	<b>INTRODUCTION.....</b>	<b>5</b>
2.1	Saarioinen Group .....	5
2.2	Saarioinen Jyväskylä.....	6
<b>3</b>	<b>SUPPLY CHAIN MANAGEMENT .....</b>	<b>7</b>
3.1	Definition of supply chain .....	7
3.2	Important drivers of supply chain.....	8
3.2.1	Facilities .....	9
3.2.2	Inventory .....	9
3.2.3	Transportation .....	11
3.2.4	Information .....	11
3.2.5	Sourcing .....	12
3.2.6	Pricing.....	12
3.3	Procurement .....	14
3.4	Supply chain process views.....	15
3.4.1	Cycle view .....	15
3.4.2	Push/Pull view.....	17
3.5	Risk in a supply chain .....	19
3.6	Risk management .....	20
3.7	Legal issues .....	23
<b>4</b>	<b>QUALITY MANAGEMENT .....</b>	<b>24</b>
4.1	Dimensions of Quality Management .....	24
4.2	Juran's Trilogy .....	25
4.3	Quality management systems: Continuous improvement.....	26
4.4	ISO 9001:2000 standard.....	28
4.4.1	Rationale for the quality management systems.....	28
4.4.2	Quality policy and objectives .....	29
4.4.3	Top management and its role within quality management systems .....	29
<b>5</b>	<b>PRODUCTION .....</b>	<b>31</b>
5.1	Warehousing.....	31
5.2	Materials management.....	33
5.3	Enterprise resource planning (ERP) systems .....	36

<b>6</b>	<b>RESEARCH PART OF THE THESIS .....</b>	<b>39</b>
6.1	Supply chain based issues .....	39
6.1.1	Facilities .....	39
6.1.2	Purchasing department .....	41
6.1.3	Important legal setting for Saarioinen .....	45
6.2	Quality Policy .....	46
6.2.1	Quality department of Saarioinen Jyväskylä.....	46
6.2.2	Self-monitoring plan and self-monitoring.....	48
6.2.3	Product quality issues .....	49
6.3	Production at Saarioinen Jyväskylä.....	53
6.3.1	Production Planning.....	53
6.3.2	Material Flow Process.....	57
6.3.3	Warehousing Logistics .....	59
6.3.4	Enterprise Resource Planning .....	62
<b>7</b>	<b>IMPROVEMENT IDEAS .....</b>	<b>66</b>
7.1	New layouts for storing.....	66
7.2	Bar code technique .....	66
7.3	Further Research.....	68
<b>8</b>	<b>CONCLUSION AND CRITICAL ASPECTS .....</b>	<b>73</b>
	<b>REFERENCES.....</b>	<b>75</b>
	<b>ATTACHMENTS .....</b>	<b>77</b>

## FIGURES

FIGURE 1	Supply Chain Integration (Bowersox & Closs 1996 , 101.) .....	8
FIGURE 2	Supply chain decision making framework .....	14
FIGURE 3	The total process of subprocesses. ....	16
FIGURE 4	Continuous improvement framework ISO 9000:2001 standard.....	30
FIGURE 5	Evolution of ERP systems. ....	36
FIGURE 6	Daily production planning.....	56
FIGURE 7.	RFID solution, its basic components and functions .....	71

## TABLES

TABLE 1.	Saarioinen Group's key figures 2006-2010.....	6
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# 1 BASIS FOR THE FINAL THESIS

Nowadays it does not matter from what field the industrial enterprise comes, the competition is tough and there are few key features, which have huge affection to the company's capability to compete against others. Grocery industry has some obvious features such as quality management, production management, product development and material flow, which will gain leverage to the competition if they are implemented correctly.

The client for the final thesis was Saarioinen Jyväskylä. The idea about the work was formed in the end of 2011, when the head teacher of our line suggested that it should be asked, if it would be possible to do the research for Saarioinen, because of the earlier experience as being an employee there. Fortunately Saarioinen Jyväskylä had some issues within its functions and they were willing to take me in to see things from another perspective and try to find solutions for existing faults.

In this final thesis, procurement, quality management, different functions in production and material flow had been the main issues. There are also functions concerning different conveyors, product development and a lot more, but they have been outlined off from the work. The main target for the thesis was to try to find some solutions, which could help to make functions better and better. Obviously it was not possible to find perfect solution for anything, since the time was limited, but those solutions suggested might be helpful in the future and they could be improved more and more in the future.

During the process, the methods used were open interviews, theme interviews and field research (Hirsjärvi, Remes & Sajavaara 2010 , 134-135.) in the factory facilities. By using these mentioned methods, interesting and important information was gathered and a good research was achieved. As a sum of these the most important research problems were found and they were the following ones.

**Research problems:**

- Is the procurement working efficiently?
- How is the company's quality policy implemented and does it fulfill the criterias?
- Is the production efficient and is there any problems concerning it?

In the final thesis, under investigation has been those main issues mentioned below and their sub features. In the development section, two subjects have been chosen, they have been analyzed and improvement ideas have been given. In addition two subjects have been chosen for the further research also.

From its nature, this thesis is applied research, since the aim is to solve problems that have been turned up in practice. Moreover strive is to offer useful and practical knowledge for the client. The present research material is based on the interviews made with the personnel, to my own knowledge about the functions in the factory and to the field research. During the research I interviewed employees from different departments and also personnel that are in the higher level positions.

## **2 INTRODUCTION**

### **2.1 Saarioinen Group**

Saarioinen is a domestic grocery company, which has been running already over a half-decade. The first operational location was at Sahalahti in the beginning of 1950's and Saarioinen turned to a joint-stock company in 1955. Saarioinen group's hard work and innovation has been the key to the success of today. Saarioinen has always kept traditional everyday foods in their production and that is one of the reasons why Saarioinen is one of the biggest companies in its area in Finland. Of course other production like meat (raw material) production cannot be forgotten, since those raw materials gives the ability to produce many other products.

Saarioinen has its production in six different locations all over the country and also one factory in Estonia. Saarioinen group employs almost 2100 persons in these 6 locations in Finland and in Estonia there are approximately 130 employees. The head office is located in Tampere and it was built in 1991. From Tampere head office will be handled administration, selling and marketing, financials, salaries, purchasing, export, public relations and It-operations. There will be shown the most important figures between 2010-2006 in table 1.



**TABLE 1. Saarioinen Group's key figures 2006-2010.**

<b>Saarioinen Group: Key figures</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>	<b>2006</b>
Turnover (mil Eur)	326,8	340	342,2	326,9	307,5
Turnover change	-3,90 %	-0,60 %	4,70 %	6,30 %	5,20 %
Profit (mil Eur)	15,6	15,4	16,2	24,8	14,1
% from turnover	4,80 %	4,50 %	4,70 %	7,60 %	4,60 %
Result before random batches	13,9	14,6	15,6	24,1	13,9
% from turnover	4,40 %	4,30 %	4,60 %	7,40 %	4,50 %
Net investments (mil Eur)	15,1	37,3	27,4	18,3	16,6
Return from placed capital	8,50 %	8,90 %	10,60 %	16,40 %	10,20 %
Liquity ratio*	1,4	1,3	1,2	1,3	1
Gearing ratio*	56,00 %	54,50 %	57,10 %	58,30 %	53,40 %
Stressed net debt (mil Eur)*	24	28,4	15,9	-0,3	22,2
% from turnover	7,30 %	8,40 %	4,60 %	-0,10 %	7,20 %
Average personnel	2098	2138	2253	2229	2240

\*) At the end of season

## 2.2 Saarioinen Jyväskylä

Saarioinen Jyväskylä is a meat (raw materials) production plant. Its slaughter house handles domestic pork- and cow meat almost 20 million kilograms on yearly basis. To the production belongs different kind of meat assortments, chunked meat and other raw meat products. Also consumer packed meat products, ground meat products, beefs and cold cuts belongs to their range. Daily production at Saarioinen Jyväskylä is approximately 80 tons and the factory employs almost 270 persons. (Saarioinen introduction, Key figures 2012.)

## 3 SUPPLY CHAIN MANAGEMENT

### 3.1 Definition of supply chain

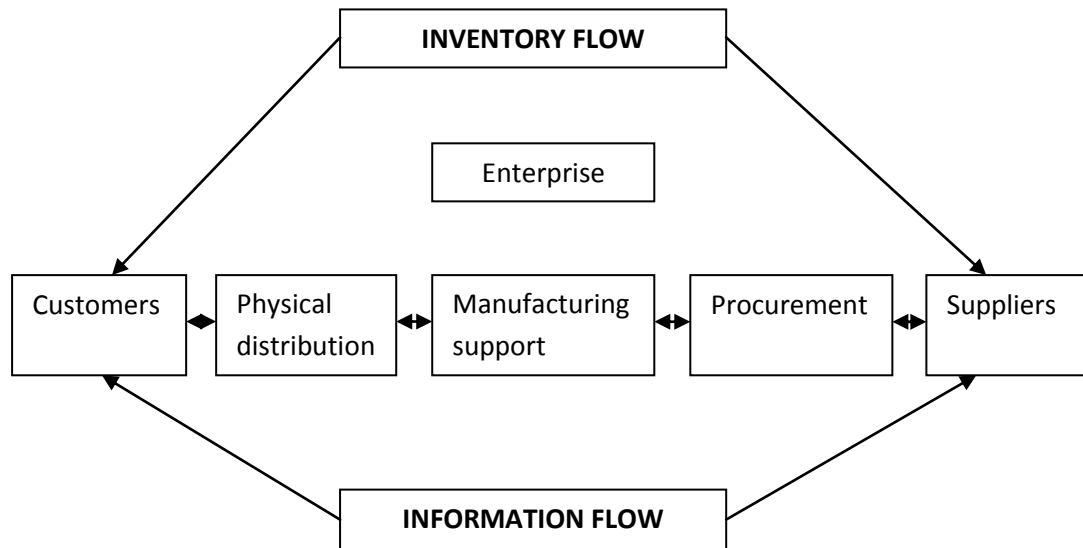
A supply chain is a huge chain, which usually have several different parties involved but the aim of them all is still the same, to fulfill customer request. The network of supply chain is not a simple one and it requires a lot of trust between parties involved, since there has to be a constant and functional flow of information, product and funds between them. The flow does not just go to one direction, but it goes both ways, from left to right and right to left.

For all supply chains, the most important thing is the customer, since it is an integral part of it. When the supply chain works well, the customer needs will probably be fulfilled and that will lead to the objective in the process, which is generating profits for the supply chain parties. That is to say that there are several factors, which are influencing supply chains and different stages included. Those stages are:

- Customer
- Retailers
- Wholesalers/Distributors
- Manufacturers
- Component/Raw material suppliers.

All these stages are often connected to each other in a supply chain. The connection comes through the flow, where products, information and funds are involved. A common situation is that the flow occurs in both ways, but the managing differs sometimes, it is handled by one of these stages or by an intermediary. There are two kinds of supply chain structures, which can be used and the criteria of the chosen one are affected by customers and by the roles of the stages. One structure is the normal one, where stages mentioned above are involved and the other is where products are customized. This means that the products will be produced only when the customer places the order. In most cases these customized products do not flow through the whole chain/stages, but they will go straight from the supplier to the customer.

(Chopra & Meindl 2010 , 2-4.)



**FIGURE 1.** Supply Chain Integration (Bowersox & Closs 1996 , 101.)

### 3.2 Important drivers of supply chain

Every company has a competitive strategy, which will be supported via balancing responsiveness and efficiency. It is really important to examine and adjust 6 different drivers, which are divided into logistical and cross-functional categories, to understand and achieve improvement in a company's supply chain. These drivers are very closely related to each other in a supply chain and they interact with each other. By them, the company's supply chain's responsiveness and efficiency can be measured and that can be turned into the performance level of that particular company. The aim is to try to reach the best possible responsiveness at the lowest possible cost by structuring the drivers. Those 6 drivers are facilities, inventory, transportation, information, sourcing and pricing. (Chopra et al. 2010 , 41.) They will be discussed closely below.

### **3.2.1 Facilities**

Facilities are an important part of a supply chain, since they are the actual physical locations. There are several factors such as the role, location, capacity and flexibility, which will have a great impact on the performance of a supply chain. Facilities are divided to two major types, which are called production sites and storage sites. There is often the kind of situation that a distributor will have many warehousing locations close to customers which increases responsiveness but affects efficiency degradingly. The other possibility is that a distributor would have fewer warehouses despite the fact that it would reduce responsiveness, although efficiency would be in a better level. The main issue for a company is to find a balance between these two options. (Chopra et al. 2010 , 41.)

### **3.2.2 Inventory**

Inventory is a part of a supply chain and it consists of all raw materials, work in process and finished goods. If a company changes its inventory policy, it can change the efficiency and responsiveness of a supply chain. Inventory is a confrontation of efficiency and responsiveness, since the company needs to decide whether to be efficient or able to respond to the needs of a customer. Large inventories will give a good responsiveness but they will also create more costs and that way decrease efficiency. One way to avoid huge inventory costs but still keep good responsiveness, is to work harder to shorten product and replenishment lead times.

Work in process (WIP), is an important activity for the inventory. When goods come into a warehouse, stay there, will be assembled, stay in a finished goods warehouse and will be sold, all these phases belong to work in process. The aim for a company is to shorten this whole chain to become more efficient and responsive, meaning that goods will be finished and delivered faster. Also costs will be reduced, because storing times will be reduced during these actions.

Efficiency, responsiveness and lead time are also important terms when working with inventories. They will be discussed shortly below.

**Efficiency;** Activities will be done carefully and professionally, with a good quality. Usually costs are not too huge, when working efficiently, because cost reduction is one of the aims.

**Responsiveness;** Costs are not so important when working responsively. The aim is to act quickly when needed and respond to the needs of a customer at a short notice.

**Lead time;** Lead time is the time between the process starting point and the process ending point, in other words lead time is the time used to accomplish a process from the start to the end.

**Inventory cost;** When talking about inventory costs, it is not that simple as many might think. Inventory costs are counted from the time of production until the product is in use and there are several factors affecting the costs. Inventory cost per item can be calculated with the following formula:

$$C_1 = PR \left( \frac{V}{q} + T \right)$$

$C_1 =$  *Inventory cost per item*

$P =$  *average item value (Euros/item)*

$R =$  *inventory carrying charge (fraction of item value per week)*

$V =$  *shipment size (items/load)*

$q =$  *customer demand (items/week)*

$T =$  *supplier to customer transit time (weeks)*

(Chopra et al. 2010 , 41-42.; Lead time; Burns, Hall, Blumenfeld & Daganzo 1985 , 472-473.)

### **3.2.3 Transportation**

Transportation is a part of a supply chain which enables the inventory movement from a place to another. There are several ways to transport goods, such as by road, by rail, by sea and by air. Combinations between the modes can also be made. All these ways and modes create different kind of efficiency and responsiveness via their characteristics of performance. The company needs to decide whether it needs faster delivery time with higher costs or is it enough to have a slower transportation mode with lower costs. As a notation, it does not always mean that slower transportation would create less responsiveness and efficiency, since the delivery times are not always that critical.

For example, if there are spare parts, which will be transported from Sweden to Brazil and they need to be in a Brazilian factory in two days, it is obvious that sea transportation is not an option in this case. The only way to get them there on time is to use air transportation, because the delivering time is critical.

A good example about non-critical delivery could be products, which needs to be in Rotterdam after one week and they will be transported there from Helsinki. There is no need to use expensive air transportation in this case, because it can be done by sea, by road, by rail or even by a combination of transportation modes (rail+road) and on time.(Chopra et al. 2010 , 42.)

### **3.2.4 Information**

Information is probably the most important driver in a supply chain and it has the biggest potential in performance, since it affects directly to the other drivers. Information gathers the data and analysis concerning facilities, inventory, transportation, costs, prices and customers throughout the whole supply chain. It gives a great chance to improve supply chain and make it more efficient and responsive. E.g. a company can gather information and use it when creating customer patterns. That way a company can use historical information to forecast the demand for a certain product, which can lead to better efficiency and responsiveness. Good success in these actions can also provide benefits in a form of lower costs.

An important fact should be remembered, when dealing with data and information. Against many thoughts they do not have the same meaning. Data is the raw material and by manipulating it through the operations that would make the situation to be more understandable, information will be produced. Information is very useful tool, since it is about facts or conclusions and it has meaning within a context. An organization should be able to decide what kind of information is useful and implement it effectively to be successful in its operations.(Chopra et al. 2010 , 42 ; Oz. 2006 , 7-8.)

### **3.2.5 Sourcing**

When thinking about sourcing, it is a choice to be made about performing activities such as production, storage, transportation or information management by the company itself or some outsourced company. These decisions are very important, since they affect the efficiency and responsiveness in a supply chain. A company may achieve a very good efficiency by outsourcing some actions but as a return, it may lead to lower responsiveness because of long distances for example. This means that consideration between insourcing and outsourcing decisions should be made carefully to find the best possible combination of activities for the company. (Chopra et al. 2010 , 42.)

### **3.2.6 Pricing**

Pricing is the last one from the six drivers in a supply chain. A company has a certain variety of goods and services available in a supply chain. Pricing defines the charge of them and it affects as well the behavior of a customer as the supply chain. As an example, delivery lead time might be a basis of charging for a company. In one case a customer would order early if good responsiveness is needed and the other customer could need good efficiency so the order would be made just before the transportation of a product. Differentiation in pricing would be a good choice for the both kind of customers, for those who value responsiveness and for those who value low-cost services.

There are a lot of different examples of how the price of a product will be formed. All the expenses need to be calculated carefully and after that the pricing is possible to be done, though it is not that simple because the contribution margin of a product should be left to a decent level after pricing. In one example, the expenses of a product will be formed from invoice price, cost of placing orders, manufacturing costs (raw materials, labour, power, packaging and waste), overhead costs, warehousing costs, opportunity costs and transportation costs. After calculating all these together, the contribution margin will be set to a certain level, which will enable the pricing operation to be made.

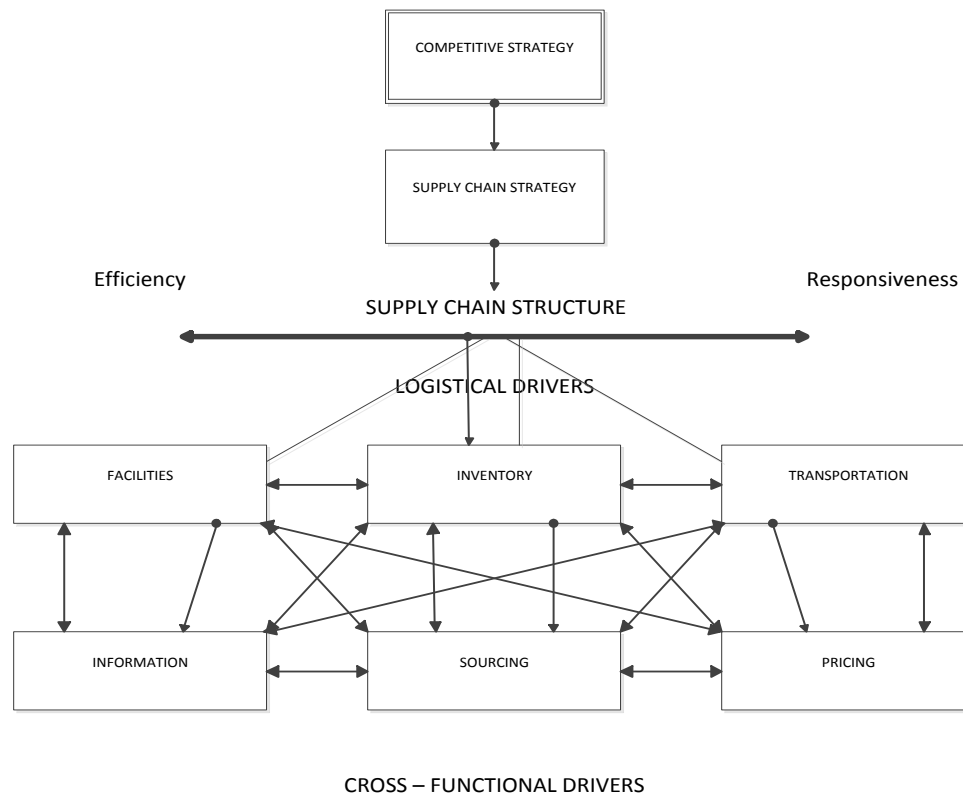
**Example of a pricing:**

If own costs are 200 Euros and Gross-Margin should be 45 %, the price should be then:

$$200 / (1 - 0,45) = 363,64 \text{ Euros}$$

(Chopra et al. 2010 , 42-43.;Harrison & Van Hoek 2011 , 86-87.)





**FIGURE 2. Supply chain decision making framework**

### 3.3 Procurement

The role of procurement in a company is huge, since the aim is to get value for the company and for their customers. Procurement areas can be classified by the purchaser, by the needs or by the situation. When talking about purchasers, they can be private customers, companies or public organizations. Raw materials, half-products, end-products, maintenance accessories etc are all considered as purchases.

Procurement includes company's external trades and its part in Finnish companies can be even 70-75 % of the turnover. It is expected that when the number of subcontractors is increasing, the number of procurement's part will increase at the same time. (Koivisto & Ritvanen 2007 , 31-32.)

Procurement's responsibilities are to determine the need of purchases and to find the most effective, competition advancing, reliable and capable purchasing sources. After that the functions of them should be coordinated with the own company so that both parties would benefit from the cooperation. People who work within procurement, need to have knowledge and skills enough to handle everyday tasks, such as contract negotiations, purchasing budget, supplier comparison etc. Choosing suppliers is very responsible and prominent operation. After comparing and putting suppliers out to tender, they should be motivated to supply everything as the company wants it to happen. Combining the purchases inside a company enables to make valuable purchasing acts for the company. (Koivisto et al. 2007 , 32.)

### **3.4 Supply chain process views**

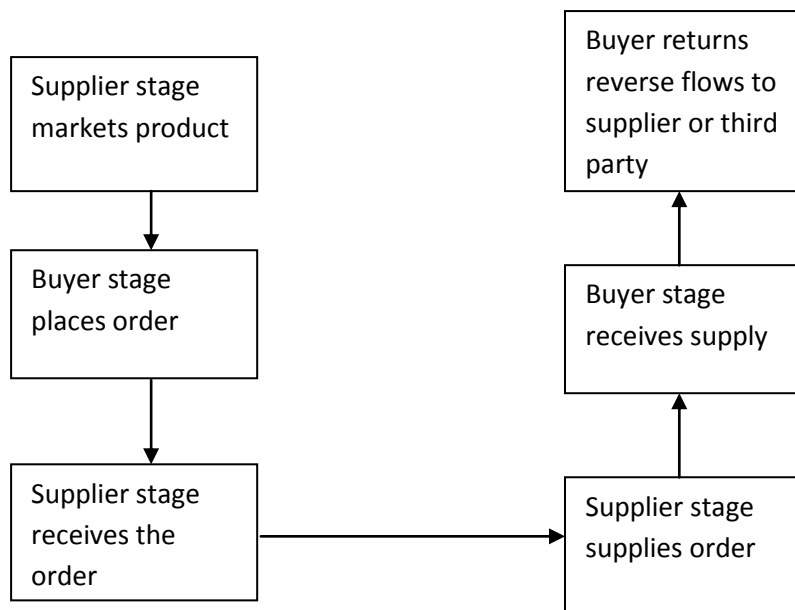
#### **3.4.1 Cycle view**

Cycle view of a supply chain process consists of four different cycles and five different stages. As mentioned in the definition in the supply chain part, those stages are customer, retailer, distributor, manufacturer and supplier. These suggestive stages have occurring interfaces, which are formed by the four cycles. It is obvious, though, that it depends on the field where the firm is operating, how many cycles and stages are involved. E.g. grocery supply chains usually have all the cycles and stages, but some companies which make customized products, do not have retailers and distributors in use at all. That also blocks one of the cycles away.

The four cycles are:

- Customer order cycle
- Replenishment cycle
- Manufacturing cycle
- Procurement cycle.

In every cycle, six subprocesses are involved. The total process of subprocesses will be demonstrated in figure 3:



**FIGURE 3.** The total process of subprocesses.

Product availability and achieving the economies of scale is the target within the cycle. The supplier forecasts the demand and tries to reduce the received order costs. After that the aim is to fulfill the order accurately and efficiently, obviously on time. The buyer is responsible from their side, meaning that receiving costs should be tried to reduce and reverse flows carried out. These kind of actions between supplier and customer will eventually lead to total cost reduction and more environmental operations. As clarification, economies of scale means increased products efficiency as the number of produced goods increases. It's typical that a company who achieves economies of scale, also achieves to decrease the average cost per unit when production is increased. The reason is that fixed costs will be shared over increased amount of goods.

The customer order cycle differs from all the other cycles, since its demand is external for the supply chain, so it makes it uncertain. Within other cycles the order placement is uncertain, although it can be sorted out by cooperation of supply chain stages. When going from customer stage towards supplier stage, order sizes increases thus individual orders decreases.

This makes information sharing and operating policies, between supply chain stages, even more important when the movement is heading further away from the end customer.

By using supply chain cycle view, operational decisions are easier to make, because it clarifies the specification of the roles in the supply chain. Detailed process description is known beforehand and this way the designer of the supply chain is forced to think about the infrastructure carefully and how it would support all processes the best possible way.

Even the supply chain cycle view helps in decision making, few things that can cause trouble, should be considered. First of all bullwhip effect can be very problematic, since it has been caused by information distortion in a supply chain. Many times when talking about bullwhip effect, it means that upstream parties does not have information about real consumer demand. These companies base their order decision to the next downstream company and this may lead to amplified order variability. In other words, the downstream company does not have variability enough compared to the upstream company's demand. By achieving improvements in handling bullwhip effect, some good advantages can be reached as reduced lead times, upgraded order procedures, restricted price fluctuations and integrated planning and performance measurements.

(Chopra et al. 2010 , 8-10.; Economies of Scale; Fransoo & Wouters 2000 , 78-79.)

### **3.4.2 Push/Pull view**

The demand is the key when choosing either pull or push category in a process. If the demand is certain, pull is the right approach for the process and when it is about push approach, the demand has been forecasted. Differently put, this means that customer orders drive the pull process approach and anticipation of customer orders is the driver for push method.

As pull method is considered to be reactive process since it responds when there is customer demand and push method is called a speculative process, since it responds to forecasted (speculative) demand, operations are not that simple in every case. Inventory and capacity decisions are playing a big role here, since they have been made many times in a push phase.

It is up to the manufacturer, whether they want to ensure availability (make-to-stock) of a product or observe make-to-order approach. A firm has a certain strategy about where the push/pull phases will be located, this is closely connected to the cycle process view. When a firm has a make-to-stock strategy, procurement cycle, manufacturing cycle and replenishment cycle are part of the push process. This kind of a strategy ensures the availability, since when customer order arrives, there are products in stock and they can be delivered to the customer. The information of the orders flows down to the procurement cycle, where they will start the same round again and the new products will be made as replenishment to wait the forthcoming orders.

One possible option for a firm is make-to order approach. No finished product inventory is involved and the customer order activates the production of the product. Make-to-order approach does not necessarily need to involve resellers or distributors and this case products are delivered straight to the customer. As it was said in the Dell example, this means that customized products are also possible and the producer will do what the customer wants. Component orders are not made because of customer orders, but the demand is forecasted, so it makes a lot of challenges for a firm to set up the right component levels in an inventory.

The good thing here is that the customer knows about the firm's make-to-order approach and the delivery times are not that critical, even they cannot be too long either.

Few mentionable matters affecting to production, are dependent demand, independent demand and bullwhip effect. For a company, if dependent demand exists, it is very good situation. The reason for that, is the fact that dependent demand is predictable in most of the cases, because it is based on some known factors. As an example, car tyre factory's relation to a manufacturer of cars can be given. If 300 cars are manufactured in a daily basis, it is simple to calculate that 1500 tyres should be ordered, since every single car will need 5 tyres.

Independent demand is then much more complicated issue for a company. The demand cannot be predicted, so planning and control has to be based on experience and understanding of a market. The volume and specific needs of a customer needs to be estimated by forecasting the demand. This means also that a firm has to take a risk that in a worst case scenario, they might run out of stock.

Supply chain design and strategic decision concerning it are in huge role and they are very important for many firms. A push/pull view is an excellent and useful tool when considering these choices. The main idea is to find the right push/pull boundary, so that the supply chain's effective supply and demand can be reached. (Chopra et al. 2010 , 10-12.;Slack, Chambers & Johnston. 2001 , 309-310.)

### **3.5 Risk in a supply chain**

When managing with supply chains, it is a huge challenge to make them run successfully. There are a lot of risks involved, since they are very complex functions. Managers want to have efficient supply chains by changing operations, so that they could get improvements, but it may cause vulnerability for the chain because they have not considered the consequences of risks. These kind of actions may turn into disruption in organizations and the main reason is that managers are not totally aware what they are doing.

As supply chains have several parties, one's manager's actions may lead to harm the other parties, since they are involved in the chain. This may turn to a so called snow ball effect, one disruption/harmful action may cause another and it will keep on going since the whole supply chain is a mess or can even be destructed.

If a problem occurs and even it would be a minor problem, it can affect very widely and bring serious consequences. A company can suffer from knock-on effects and they can affect to the company reputation, perception of brands, ability to win orders, quality, prices, profit margins, lead times and a host of basic performance measures. All these can be started e.g. from a late delivery of raw materials. These problems will lead to another and it is simply the fact that a firm will lose huge amount of money because of this kind of incidents. (Waters 2011 , 48-49.)

### **3.6 Risk management**

The starting point for supply chain risk management would be that senior logistics manager should scope the whole organization's risk strategy and then tries to identify its needs from logistics point of view. Supply chain risk management is very important, since it has a huge responsibility to block/mitigate the risks in a supply chain. A key driver is a company's senior manager's established principles, which should be adjusted to risk in logistic actions.

First step is to make long-term plans for the risks concerned the supply chain. After making them, they should be put into supply chain risk strategy, since it contains several factors related to risks in a supply chain, such as all the long-term goals, plans, policies, culture, resources, decisions and actions. A written document, called a risk policy, strategic plan etc. is the paper where all the main elements of this strategy will be found. A strategic plan takes a wide point of view, so it does not concentrate to any specific risk. The main idea is to find the risks in a supply chain in general and how all risky events would be handled by managers. According to Waters, there are a lot of contents in a strategic plan and they vary widely but it typically includes these ones mentioned next:

- The aims and targets to be achieved by SCRM, and its place in the business culture.
- Statements of who is responsible for SCRM, the work of risk management teams, their membership, other details of the management structure, roles and responsibilities.
- A review of the organization's attitude towards risks, extracted from its broad strategies and consequent objectives for SCRM.
- A summary of corporate policies relevant to supply chain risks and the scope of SCRM.
- A review of the resources, systems, tools and facilities available for SCRM.
- Procedures, methods, and tools for assembling a list of risks and their causes, likelihoods and consequences.
- Procedures, methods and tools for analyzing the impact of risks and their significance.
- Procedures, methods and tools for designing alternative responses to the risks and selecting the most appropriate.
- Policies for allocating and sharing risks among stakeholders.
- A summary of training, education and communication needs.
- Methods for monitoring risks, maintaining the risk management process, updating procedures, communicating results, measuring performance and achieving continuous improvement.

Supply chain risk management is an important part of supply chain risk strategy and it needs high commitment, since all the lower level decisions and actions are set by SCRM and finally they will be implemented. Some decisions are not devolved and some of them are so important that a senior manager has to be directly involved. The amount of risks that a senior manager should be responsible for is around dozen, risks that could be a serious threat for the whole supply chain. E.g. moving to offshore sourcing or launching a new product should be totally coordinated and approved by a senior manager. *The idea of risks at different levels illustrates one of the interesting developments in risk management, which is its growth in two directions. The first extends traditional methods into new areas – such as the supply chain. The second moves towards strategic issues, loosely described as “enterprise risk management”. (Waters 2011 , 82-83.)*



## **The aim of supply chain risk management**

Overall, the aim of supply chain risk management is to find a way to make sure that materials will run through the whole system smoothly and without interruptions. The idea via this kind of achievement, is to ensure supply chains planned working. In other words this mean, that the supply chains are less vulnerable, they can stand more unexpected events and there has been improvement in sustainability or resilience.

Vulnerability tells how weak is the supply chain and resilience how easily the chain will be back to normal after some kind of damage. Different circumstances determines whether the tactic will be reducing vulnerability in a supply chain, so risky events will be tried to block. Other option is to accept that risky events will occur and then try to return the chain to normal as quickly and well as possible after the damage has happened. Waters say, that to support the underlying aim supply chain risk management, which is uninterrupted material flows, there are several smaller goals to be achieved:

- Designing a supply chain risk strategy that fits in with higher organizational risk strategies and sets the context for SCRM.
- Meeting any legal, regulatory, contractual or societal requirements for risks.
- Embedding risk management within the function of supply chain management.
- Ensuring appropriate resources, systems, facilities and infrastructure for SCRM.
- Identifying best practices for supply chain risk management with relevant procedures, technology, information and planning.
- Using these practices to indentify, analyse and plan responses to risks that are relevant to SCM.
- Implementing the planned responses to risks when necessary and controlling the subsequent actions.
- Monitoring performance, continually developing and improving methods.
- Cooperating with other parts of the organization and members of the supply chain to give a coherent attitude towards risks. (Waters 2011 , 87-88.)

### **3.7 Legal issues**

Legal issues in grocery industry are very important, when everything is about groceries for human beings. In this research the issue is about living animals and meat production from them. There are legal issues which have to be followed, but also some legislation that should be followed and still can be adapted. That might turn out to be problematic, if there are not certain rules about everything in every factory involved to grocery industry. E.g. if a company have its own cattle shed, animals can be kept there but usually it is not recommended to keep them too long, meaning over the whole weekend. This does not still mean that it would not be possible, since this discretionary matter and every single company can decide, whether they act this way or not.

## 4 QUALITY MANAGEMENT

### 4.1 Dimensions of Quality Management

Several dimensions of product quality have been defined during years. David Garvin has composed one of the most well-known and respected quality dimensions list. Garvin found five different definitions for product quality, which are transcendent, product-based, user-based, manufacturing based or value-based and then developed a list, which consists of eight different quality dimensions. This list of dimensions will give more detailed and specific description about product quality. The dimensions are following:

- Performance
- Features
- Reliability
- Conformance
- Durability
- Serviceability
- Aesthetics
- Perceived quality.

Service quality is another point of view to think, when considering dimensions of quality. Whether they have a lot of in common with product quality, service quality is still more complex, since it has more diverse attributes. The reason for that is wider variation, which is evolved from high customer involvement. It does not matter what kind of mood a factory worker has as long as the production is performing in a right level, when thinking about the quality.

In other case, if a person is working as a cashier of a super market and he/she is having a bad mood, it may spoil the whole customer service situation and lead to the bad quality. Here was only few examples of service quality variation, which could be happening.

Three marketing professors from Texas A&M University, Parasuraman, Zeithamel and Berry have published a list of service quality dimensions, which are used widely. They are defined next:

**Tangibles:** If the physical appearance is in a correct level, the service quality is also in a correct level.

**Service reliability:** A firm has a promised level of services and when they can perform dependably and accurately when needed, it creates service quality.

**Responsiveness:** When services are wanted, the provider should be helpful and respond quickly, which will be considered willingness to serve customers.

**Assurance:** Customer should feel safe and have trust that the employee has knowledge to provide good quality services.

**Empathy:** A service firm should be able to give enough care and attention to the customer.

## 4.2 Juran's Trilogy

Joseph Juran is one of the pioneers, when it comes to the growth of quality during the past half-century. Juran takes strategic and planning-based point of view to the quality and he claims that poor planning of quality actually makes most of the problems for organizations. He suggests that organizations should monitor and renovate their strategic planning processes and achieve the best possible success over these processes. The aim via these actions is to find the right goals and plans, which will help to reach those goals.

Juran has implemented a trilogy (Juran's trilogy) that identifies three processes, planning, control and improvement. These processes are fundamental, when managing quality improvement.

First step is quality planning. Customer's needs should be able to meet by providing operating forces, which is purpose of quality. Operating forces have a specific job and that is producing the product, after the plan is complete. Many times when operations goes further, there exists deficiencies in quality and it easily becomes chronic, since it was planned that way. Usually the operating forces cannot do anything to get rid of that chronic waste and the act against is quality control, trying to make sure that the things would not get any worse.

Control is the second thing that Juran's trilogy consists of. Process data collecting is in huge role, because it helps to find out if the processes are stable and the outcome relatively coherent, how they should be. Controlling the processes, breakthrough-related activities are possible to achieve. It should be understood that these two should occur at the same time. There may be a generic believe (among managers) that it is not possible to make bigger improvements, when improving continuously. The reason for this kind of thinking is that continuous improvement focuses on details and cuts off the possibility for larger needed changes, even there is nothing precluding in continuous improvement. It is most likely that the best result in improvement will be achieved by mixing continuous improvement and breakthrough improvement activities.

According to Juran, project-by-project approach is the right way to accomplish improvement in organizations. Manager's should think carefully and then prioritize all the projects before choosing the ones that will be implemented first. Hierarchy of languages exists in organizations and it usually begins from the lowest level. There the language is about things, spoken by analyst and it is typically technical including engineering terminology. These analysts should be able to turn the language to the management level, where the language is money and then it will be easier to determine the projects that should be implemented. In other words, chosen projects will be based purely to the financial return. Problems may be caused when trying to improve quality, it may occur as bottom-line results. (Foster 2010 , 67-68.)

### **4.3 Quality management systems: Continuous improvement**

Quality management systems are cooperation between suppliers and organizations. First of all, suppliers should be aware of different processes and they should be documented. Links and sequences for the processes should be regularized also by suppliers. Organization's responsibility is to find out the effectiveness of their operations. Availability of information and resources sets the level of performance, meaning the right quality and quantity for running the business.

Monitoring, measuring and analyzing are very important activities for the effective operations and organizations should be able to make changes, if needed, to achieve the planned results and making sure that continuous improvement would be reached.

Management have a lot of responsibilities such as, developing policies, communication with customer service, clarifying/finding the right objectives for quality, give the managerial reviews and provide the right kind of resources. If a manager is responsible and has an authority to make corrective actions when needed, he/she need to be informed when products are not meeting specifications. Then he/she also needs to supervise that corrective actions will be done to solve the problems.

Resources have a huge impact to quality management and to the success of it. Management is responsible to provide resources and they are usually used to sustain the quality management and also to meet the customer needs, training and human resource management are one relevant part of it. Infrastructure should be provided, meaning that right tools, equipment and supporting systems are in right place at the right time. Infrastructural issues require mature planning and implementation. Environmental matters are not something to forget, since safe, clean and decent environment will affect to employees satisfaction at working place.

Adequate planning is the key word, when product and processes are in consideration. Quality objectives should be known and they should be included to the product. Customer needs are priority number one and they should be carefully considered before implementing processes, without forgetting the regulations. All these issues are a part of product realization, which have also aspects such as purchasing, suppliers, control plans, setups, preventive maintenance, traceability and also other aspects, which have something to do with designing and producing products.

When measuring, analyzing and improving, documentation should be provided by the company. From the data can be seen the conformity of product and quality management system, but also improvement of quality management system. This documentation will include all the important aspects, which are needed, such as:

- Statistical tools
- Measurement systems
- Measurements for customer satisfaction
- Internal audits
- Other considerations.

(Foster 2010 , 294-296.)

## **4.4 ISO 9001:2000 standard**

### **4.4.1 Rationale for the quality management systems**

Quality management systems are practical when trying to enhance customer satisfaction. Customers have certain characteristic needs in products and all these needs and expectations are turned into customer requirements, which are mentioned in product specifications. Customer requirements can be defined in two ways, by the customer (contractually) or by the organization itself, but in both cases, the customer has the power to decide whether the product is acceptable or not. Changing expectations, improved technology and tough completion have lead to a point when organizations have to improve continually, when it comes to their products and processes.

Customer requirement analyses, process definitions, process control have been advanced by the quality management system approach. The system offers the framework, which can be used for achieving enhanced customer satisfaction and satisfaction of other interested parties. Successful implementation of the framework increases organizational confidence and gives trust to the customers, about the products which will be provided, that they are going to fulfill the requirements

#### **4.4.2 Quality policy and objectives**

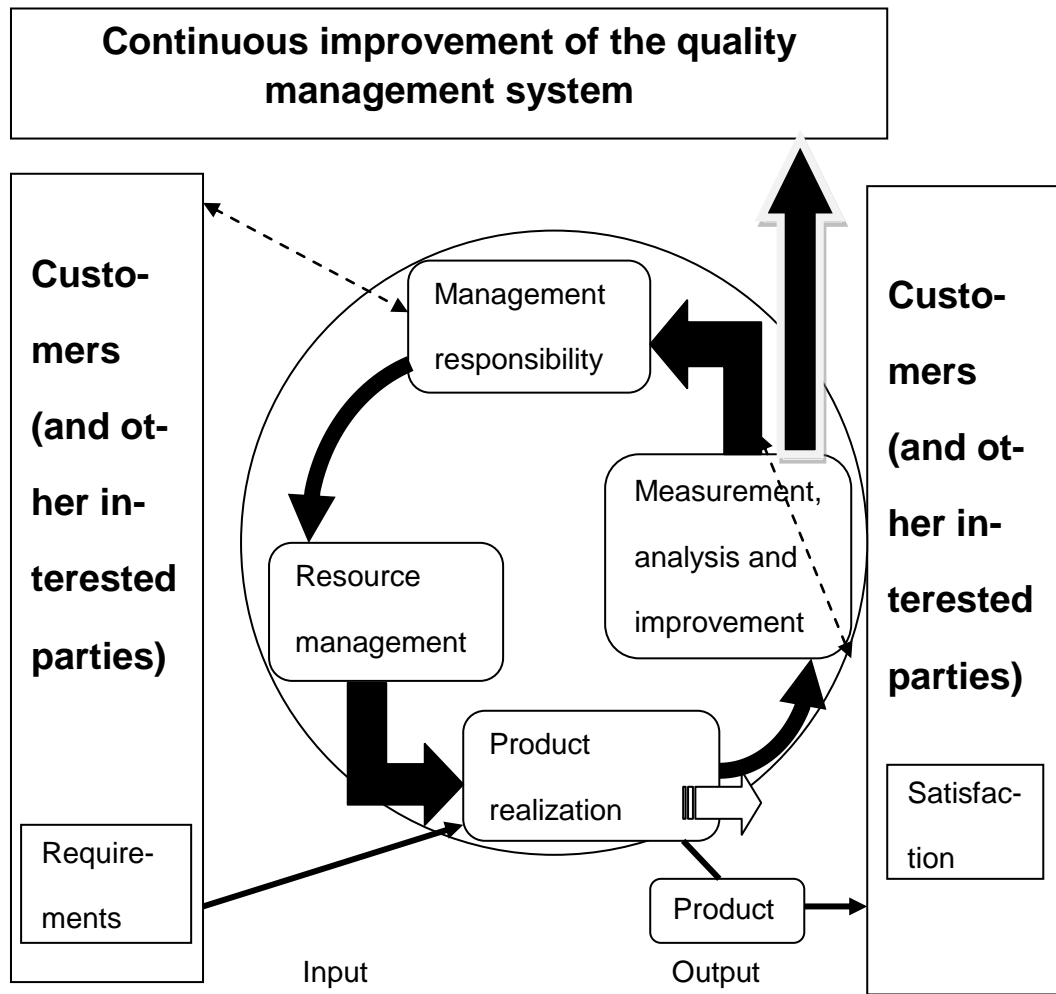
Directing the organization is the reason for establishing quality policy and quality objectives. Desired results are defined via both of them and they will help organization to use its resources in a correct way to achieve the wanted results. The quality policy offers a framework, which can be used to go through and establish quality objectives. Quality objectives need to have a solid connection with quality policy and commitment to continuous improvement, so it means that they need to be coherent with each other. When this point has been achieved, they also have to be measurable. Better product quality, effectiveness in operations, financial performance, satisfaction and confidence of interested parties can all be achieved by quality objectives.

#### **4.4.3 Top management and its role within quality management systems**

Top management can create the kind of environment, where individuals are perfectly involved and a quality management system is able to operate effectively. This can be achieved through leadership and certain actions. There are quality management principles, which can give base for top management's role, if they are implemented. They are as follows:

- To establish and maintain the quality policy and quality objectives of the organization.
- To promote the quality policy and quality objectives throughout the organization to increase awareness, motivation and involvement.
- To ensure focus on customer requirements throughout the organization.
- To ensure that appropriate processes are implemented to enable requirements of customers and other interested parties to be fulfilled and quality objectives to be achieved.
- To ensure that an effective and efficient quality management system is established, implemented and maintained to achieve these quality objectives.
- To ensure the availability of necessary resources.
- To review the quality management system periodically.





**FIGURE 4** Continuous improvement framework ISO 9001:2000 standard

## 5 PRODUCTION

### 5.1 Warehousing

Warehousing is an important part of production, since it relates very closely to it. In warehouses can be hold raw materials, materials in process and finished products. When thinking about warehousing, everything is usually calculated based on quantity. One challenge can be the fact that quantity is sometimes confused with quality and that should not happen. As an example, if there are highly productive warehouse operations somewhere but s lot of errors exist, warehouses are badly kept and service level is low, it will lead to a point where quality does not matter anymore.

If the issue is about manufacturing, blocking and decreasing defects is the way to reach good quality and if it is about warehousing, loyal employees and loyal customers are the meter for product quality. There are basically no limits when trying to improve warehouse productivity but it is said that there are eight possible improvements considered. Five of them, which are critical, are mentioned below:

- Targets for improvement should be created.
- Distances traveled should not be too long and they should be reduced if possible.
- Average sizes of loads should be checked and increased when possible.
- Check out good movements within the warehouse.
- Improve the utilization of warehousing space.

There are a lot of random operations involved in warehousing, for example manufacturing has less them and that is a reason why it is very difficult to develop work standards for warehousing. Though productivity goals are predetermined and standardized by engineers, they are usable in warehouse operations.

One issue to consider is whether outsource warehousing operations or keep them insourced. When making decisions like this, it should be thought from wider point of view, since it is not just about storing inventory. There are a lot of different activities, which are involved and they should be counted in when making the decision. Those activities are such as sorting, sequencing, order selection, transportation stabilization and in some cases product modification and assembly. (Bowersox & Closs 1996 , 32.)

### **Forecasting**

Forecasting is a way to battle against uncertainties, in other words when it is about warehousing, it can save from storing unnecessary material, if the forecast is done accurately. With a good forecast, deployment of material can be handled and it can also help to reduce waste. There are two prime sources of waste mentioned, which are the costs coming from reserved space without a need for that and excessive workforce because of possible volume increase.

Variation of materials flow and its prediction are parts, which should be included into forecasts. Rush seasons are problematic, since many times they have demand peaks or sales incentives should be responded when needed. That kind of peaks may lead to waste of storage space and rise of labor cost. A positive matter is that such waste can be controlled, but it involves cooperation with marketing people department. E.g. it is possible to enter the order to a warehouse because of incentive purposes, but the shipment does not have to be made necessarily straight away, which will smooth out the work flow. (Ackerman 1997 , 298.)

### **Utilization of space**

In every warehouse, there is certain amount of capacity in use. Capacity can be controlled by the management and it should be done, since the space should be used as well as possible. That is why comparing actual utilization to theoretical capacity is the best way for the measurement of capacity. E.g. the capacity of a warehouse is 50 000 feet of high ceiling space.

After calculations it will be noticed that a bit over 10 000 pallets (10 714 pallets) can be entered into a warehouse, but there is only 5685 pallets in the warehouse, the utilization would be  $5685 / 10\,714 = 0,53$  , in other words 53 % of theoretical capacity would be in use in this case. This means that 53 would be the score of storage and this kind of ratings can be maintained during time for the use of comparison between warehouse chains. As a notation, it can be said that theoretical capacity is impossible to reach.

Sometimes there is a possibility that an inventory can be more complex. It can lead to a point when there is a lot of different kind of reserving modes involved, such as pallets, bins, major appliances, bulk containers etc. Many times categories are divided into departments and individual ratings will be made for departments in these cases. After doing those actions, the composite rating can be made for the entire warehouse. (Ackerman 1997 , 92-93.)

## **5.2 Materials management**

### **Functions of materials management**

Materials management is connected to every department in a factory. The main target is to provide the materials needed in the right place, at the right time and in condition expected, without excessive costs. The basic functions related to materials management are listed below:

- Production and material planning
- Materials handling
- Procurement of goods
- Distribution
- Control of material cost
- Communication.

If materials management works well, it can reach its goal, which is satisfying the needs of all operating systems. Those systems are manufacturing production line, the need arising from customer demand patterns, promotional activities and physical distribution schedules. Materials manager should be able to view the operating system as a customer and he should work around the system to ensure that eventually the system would work as it is supposed to, meaning that everything fits in the system and its needs will be satisfied. (Carter & Price 1993 , 25.)

### **Material flow and control**

There are few important purposes for the integrated control of the materials flow to be filled up. Materials needed should be available when required, so it would help the work flow to be adjusted in production and also inventories could be controlled more easily. Input of materials and the capacity of the manufacturing plant should be both optimized, as there would be potential forthcoming sales. And the last purpose is that the spent money should be compared to the obtained value per unit and made sure that the maximum will be reached. If all these purposes will be assimilated properly, it will give a good base to implement and sustain the materials flow.

When talking about materials control, there are several tasks involved and they should be planned carefully, without forgetting that the results should be analyzed and evaluated. Materials control requires a complete understanding of the problems involved to the materials flow in a particular organization. Those issues needs to be clarified, are for example the product complexity, the number of technical modifications and supplier reliability. Also few important questions can be asked, when dealing with materials flow and control; what should be, where should be, when should and how much is required. When these questions are known and they can be strictly answered, materials flow and control can be made properly. (Carter et al. 1993 , 26-27.)

## **Material management advantages**

According to Carter et al, implementation of materials management will bring valuable advantages with it, which are in terms of organizational control and materials control. Those advantages will be shortly discussed and analyzed next.

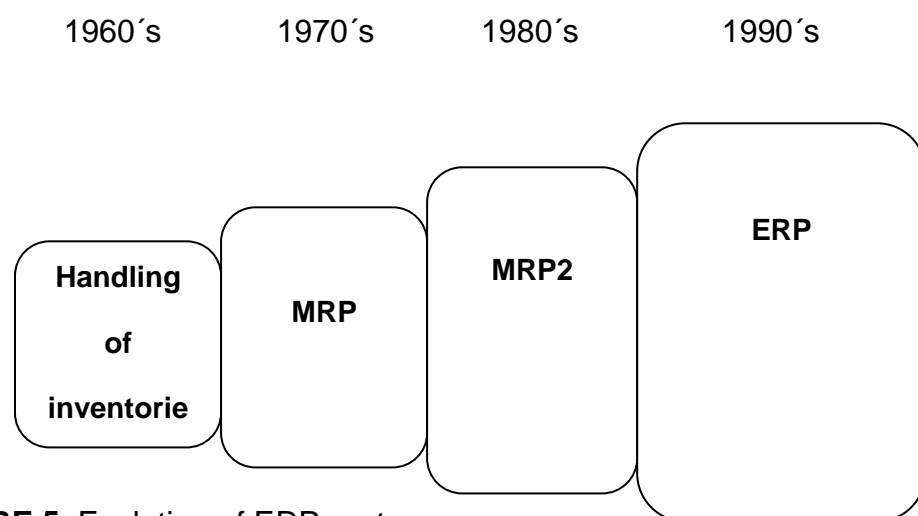
- a) Identification of costs; Rising cost areas, created by organizational material flow, can be pinpointed and that will help to take appropriate actions.
- b) A database; Information gathered about all the materials, can be used when making decisions or activities that are related to materials.
- c) Improved total control; Ability to change environmentally and organizationally when needed.
- d) Encourages and promotes; Cooperating with other parties involved to a particular activity.
- e) The appointment of a senior manager; Materials manager is responsible for the materials part in a business. Also a link between the material and non-material areas of the organization. If it is about logistics organization, the materials manager is responsible to report directly to the logistics manager.
- f) Improved stock control and stock turnover; If the interdepartmental cooperation and control are improved via well working materials management system, stock levels can be reduced to a decent level.
- g) Reduced transport costs; Efficient usage of transportation services requires close collaboration between materials based departments.
- h) Improved quality of staff; Team based working should be promoted and staff development chances offered by materials manager, so the company would be able to entice more qualified employees within.
- i) Reduced materials obsolescence; When achieving the overall control system with materials management, it will decrease datedness of the stock and that will induce to decreased total material costs.
- j) Improved quality control; Certain quality standards, which are imposed by a common materials management policy connected to quality control.

These advantages can be measured and it may lead to a point when there is not that much capital tied up in stocks, though it is not that simple. The result will come up usually in the long run in the form of shorter throughput times, less stoppages in production as a result of missing or bad quality material, improved customer service and tighter working environment. Departments will also have a common goal with the total materials job, so they will consult and communicate with each other in an atmosphere where trust and support have an important role. (Carter et al. 1993 , 27-28.)

### 5.3 Enterprise resource planning (ERP) systems

The evolution of ERP systems started from 1960's and that time there was no systems yet, since companies could not afford to have computers. It led to a situation that the only way to operate was to handle inventories and make sure that there were enough goods in the stock, so customer demand would have been satisfied.

Development continued through the years and in the 1970's MRP (materials requirements planning) was launched, which was a system for planning raw material requirements for manufacturing. The next step was 1980's when MRP2 came into picture. It was already a bit more developed system and in the early 1990's it was further extended into enterprise resource planning (ERP).



**FIGURE 5.** Evolution of ERP systems.

ERP system is a tool, which is very useful, since it gathers all the key business and management functions together. This way it can provide a view, which tells what is happening in the company in different areas. Those areas are finance, human resources, manufacturing, supply chain etc. Obviously everything is not that easy when dealing with ERP systems, because it is very important to have the most appropriate one in use, so it will be ensured that the planned objectives will be fulfilled by the selected system.

If thinking about the objectives that can be achieved and fulfilled, there few very important of them. According to the case study in the article, when making supporting decisions and trying to perform in the best possible level, it is vital that information and software aided procedures can be implicated. It was said that internal customers should be kept satisfied also, as a notation that there could be plenty of more different objectives which a firm would like to fulfill but these were mentioned. According to Kakouris and Polychronopoulos, when trying to achieve these objectives, there are needed improvements involved, such as:

- Ongoing cost-effective improvements in manufacturing services.
- Labour savings (less overtime work, not so many interruptions, the required work should be seen preferably etc.)
- Inventory reductions (market requirements should be known better, faster processes in production, no unnecessary production, quantities and delivery dates should be correct etc.)
- Better management of the resources used.
- Better process execution through the efficient use of the ERP solution (may lead to better customer satisfaction, better visibility of the work meaning the orders can be followed, more flexibility etc.)



One essential issue for implementation of ERP systems is that it is usually done one step at a time. This kind of method allows for a company an easier movement to a new system, so in other words everything is not done straight away and it will obviously reduce the amount of mistakes and hazards. Of course if the World would be perfect, everything would go without problems, but as it is not, the implementation is almost impossible to perform just like that.

In ERP systems implementation, there has been said to be three different stages. First stage takes three to nine months and it consists of jobs redefinition, creation of new procedures, tuning of ERP and organization's learning process of new streams of information. The second stage includes changes in organization, development of new skills, integration of processes and ERP systems functionality expand by adding bolt-on technologies. The last stage is then about moving all the organizational operations to the correct level and this is when the advantages will be finally achieved. (Kakouris & Polychronopoulos 2005 , 67-76. ; Olson 2004 , 105.)

## 6 RESEARCH PART OF THE THESIS

### 6.1 Supply chain based issues

Supply chain issues were covered widely in the theory part of the thesis, but in the research part, only the most important ones were picked. This claim is based on the researchers' own perception, based on the facts that came out during the process. Another imposing matter was that the time was limited and something had to be left out.

#### 6.1.1 Facilities

Facilities at Saarioinen Jyväskylä factory are mostly very old fashioned and tight. All the cutting departments are very small comparing to the amount of workers and to the amount of daily production. In chunk meat department and packing department the facilities are huge enough to perform the daily tasks. Of course everything can be managed also in cutting departments but sometimes when working days are very busy, it will lead to a point that moving in a department may be partly blocked because facilities are full of mullahs and conveyors (plastic pools where the meat will be sorted and kept). The reason for backlogs can be that the speed of production is much bigger than the assisting employees are capable to handle.

Also when delivering meat products to different departments, tight passages can be problematic because of the traffic and the direction of raw material flows. One queue maker is also the amount of scales, since there are only 2 in use for the employees. One of them is located so that it is not accessible that easily and there are 5 departments, which are using the scales. This means more traffic to the passages and more unnecessary work for the employees.

#### Conveyors

Almost all the conveyors used in the production facilities are working very well in that environment. There are belt conveyors, plate conveyors, roller conveyors and bucket conveyors (hanging from the ceiling). E.g. in the pork cutting department there are two different types of belt conveyors and one plate conveyor running through the production line from the front end of the department to the rear end of the department.

The conveyors are placed in 3 different levels and they all have a certain meaning. A conveyor, which is placed to the highest level is carrying all the bones to a room where they will be handled later on. In the middle is a conveyor, which carries all the meat to the place where they will be assorted by the assisting employees.

On the bottom is a conveyor that carries all the skins to a working place, where the skins will be separated from the meat and fat. These conveyors are working well and it is very rare that there will be any malfunctions in the system.

The weak spot is the pipe conveyor, which carries all the slaughtered animals from the slaughterhouse to the front end of the pork cutting department. The problem turns out especially in the carcass storage and in the front end of the department. According to the interviews of the employees, the biggest reason for the dysfunctionality are the components that are used in the pipe conveyor. The whole track and hooks that are hanged to the pipe, are the reason and all this has happened because the test phase was poorly handled. This has led to some drawbacks such as:

- Unnecessary work for the carcass man (pigs may fall down to the floor sometimes and they have to be pushed manually since they do not move like they should move in the storage area)
- Legal breaks are not possible sometimes (carcass man may need to work with the pigs, since the track is not working properly, so breaks may be too short or in the worst case he needs to skip it)
- The working environment and position are not normal (affects the amount of sick leaves)

This track has been implemented in the beginning of 2011, even in the negotiations came out that employees were strongly against it. The weird thing is that their opinion was asked and when they said that this kind of track should not be assembled, it still executed. These mentioned problems came with it and also one more. Now there has to be one meat cutter (salary approximately 20 Euros per hour) as a pig turning employee.

The reason is that pigs are not going well to the saw, where they will be cut to smaller pieces, so there has to be one man turning the pigs. It is a huge cost for the firm, since the problem has been over a year now and there is not idea when it is going to be solved.

**Cost calculation because of the unnecessary worker for turning pigs:**

***20 Euros per hour × 8 hours per day = 160 Euros per day***

***160 Euros per day × 5 working days per week = 800 Euros per week***

***800 Euros per week × 50 weeks per year = 40 000 Euros per year***

Here can be seen how much it will cost yearly for Saarioinen Jyväskylä, if they cannot solve the problem quickly. They should try to figure out what to do as fast as possible, because the time is running and it costs money and man hours. This is also a good example about the fact, that when something new will be implemented, it should be planned and tested properly before taking it into operation.

### **6.1.2 Purchasing department**

Like in many industrial firms, Saarioinen does not make an exception, when it comes to their purchasing department. It has an important role within the operations, since they are responsible for the whole purchasing activity. The main functions are, that they need to make sure that the purchased cows and pigs, meet the wanted volume and are also in a decent quality level. The starting point for this process is when the purchasing department gets the yearly budget from the marketing department. After that people in purchasing department starts to check out whether it is possible to deal with the present supply contractors or is it necessary to find some new ones to guarantee the budget needed. Of course one affective matter for the made purchases is the ratio between cows and pigs, meaning the kilograms of them. There may be contractors who breed only pigs or who breed only cows, also some of them may breed both. These facts are something to consider, so the budget would be as close to the wanted one as possible.

As a notation can say that the budget means kilograms in this case.

Saarioinen have had almost the same budget during recent years and it seems that the same kind of tendency will continues also in the future. The budget for 2012 is approximately 10 million kilograms of pigs and 9 million kilograms of cows. Even the budget have these number, the kilograms are almost impossible much 1:1, so it is not too strict. Anyway it should be meet, so if there will be differences in the budget, they should be a bit above the level, not below. Here will also a short list about other functions performed in Saarioinen Jyväskylä purchasing department:

- Responsible in making the supply contracts (2 years at a time or even more)
- The aim is that 80% of supplies from the own contractors (in reality; 75% of cows and 85% of pigs)
- Responsible in forecasting slaughtering of animals 15 months towards.
- Making the monthly and weekly plans for the supplies separately, meaning that first they have to make estimations in monthly basis and then define it for every single week.
- During the last week, the next week's plan will be made
- If there will be overproduction, the purchasing aspires to sell the animals towards either domestically or to the foreign countries.
- If there won't be cows and pigs enough, the purchasing department should be able to cover it. Meaning that they should try to gather new contractors, buy from the competitors or as last resort, to buy from the foreign countries. (all these options will bring some unnecessary costs for the firm).
- Trying to control the animal flow, so that there would not be days when the quality is very bad (e.g. too many old cows in one day can cause problems, since they are very creasy → more work when removing the crease and the meat quality is not very good comparing to heifers for example).

According to the interview with the head of supplies (Paavo Ryymin), it is more and more important to forecast the future. Like it was mentioned earlier, they need to be able to forecast 15 months towards and actually there is one remarkable assisting factor when doing that. The animal transmitting helps in forecasting, since it is working in the front end of the chain. It means that they are aware when cows and sows will give birth and when the small ones should be sent to the farms to grow. From these facts it can be calculated and estimated when the animals will be full-grown and that way, ready to be sent to the factory.

During the interview was mentioned also that the purchasing department is trying to work by the terms of production. The weekly amounts will be sent to the purchasing department from the production and the purchasing people handle the wanted supplies. Sometimes there can be a situation when there is too much cows and pigs coming to the factory, but it is not a critical matter, since it is possible to ask some of the farmers to keep the animals a bit longer. With cows it is easier than with pigs and the reason is that pigs are growing pretty fast when they are full-grown. There is a reasonable explanation for this and it is connected to the average weight of the animals. Because pigs are growing very fast, the average weight will be easily exceeded, which is not good for both parties, since the best price for a pig lies between some kilograms. The reason to say some, is that the average weight can change periodically.

The interview with the head of supplies was very interesting, since the other people I talked with afterwards, had a bit different kind of opinions about the whole process. When gathering the information and thinking about it, everything points to a problematic situation that the animal flow to the factory is not constant at all. Of course it cannot be constant always, but at least it would be good to have a change to control it. With cows there are not bigger problems, but when it comes to pigs, there certainly are. The major flow of pigs takes place approximately two months too early and this analyze has been made from the seasonal point of view. Summer season (from May to August) is the most important for Saarioinen, since it is the barbeque season. Pork meat is popular then, but the problem is that there have not been pigs enough for the needed demand during recent years.

One explanation heard for this is the natural breeding circulation for pigs, which actually makes sense, but still should be controlled somehow to change the present situation. There is one suggestion in my further research part and it will be told more in that section. It will be seen in the future if it was usable or not and is this a problem which can be even solved.

## **Transportation**

Animal transportation and transportation generally are very important part of Saarioinen Jyväskylä factory's operations. When transportation works smoothly, it enables the efficient and responsive movement of goods and materials to a place to another. If the goods are in time, where ever they have to be, there won't be any interruptions for the operations because of transportation. It means that one of the key drivers is working well and it will give leverage to the operations generally.

Saarioinen Jyväskylä procurement department is in charge, when it comes to their transportation arrangements. There are other two huge grocery companies in cooperation with Saarioinen and they own the logistics firm called Tuoretie Oy together, in other words they all have 33% piece of the firm. The idea in this ownership is that Tuoretie arrange the contracts with carriers (Saarioinen personnel do not have to do that) on a yearly basis and for example when Saarioinen needs trucks for their purposes, the employee in charge of transportation, takes contact to Tuoretie and they will arrange the carrier. There are 15 advocate divisions from where the transportation of animals are arranged, so it is pretty widely spread if comparing to the destinations of goods, which basically are the customers of Saarioinen apart from few exceptions.

The reason to put transportation under Purchasing in the thesis, is that Saarioinen Jyväskylä transportation arrangements are made by an employee from the purchasing department. Like mentioned, the animal transportation is widely spread and according to the interview with head of supplies, one strange matter is that the carriers take their load only from one division. Even there would be cargo nearby the border of two divisions, but in the wrong side of the border, the cargo would be left out of the truck.

Maybe it would be justified to explore the opportunities more and try to arrange those transportation another way. For example one possibility could be, that instead of having 15 separate divisions, some of them would be combined together and in the end there would be only 5 divisions. Someone might ask that what should be done with the advocates of different divisions and the answer could be that put 3 of them together to sort the affairs of one new (bigger) division. These kind of arrangements could ease Saarioinen, when trying to figure out transportation solutions, so my suggestion would be that this matter should definitely be re-examined.

### **6.1.3 Important legal setting for Saarioinen**

When talking about grocery hygiene, there are two very important EU settings and one domestic setting, which need to be followed:

**EU setting N:o 852/2004** (Grocery hygiene)

**EU setting N:o 853/2004** (Special hygiene rules involved to groceries made from animals)

**Domestic (MMM) setting N:o 1369/2011** (Fulfilling settings added to EU settings)

In Finland there is a bureau called Evira in grocery field. They have made several directives concerning to grocery industry. Most of Evira's directives are interpretation of law, but if some company will act differently as it has been said in the directives, they have to have an excellent explanation for the actions they implemented. The reason is that from the point of view of authorities, Evira's directives are quite compulsory, so adapting those directives is almost impossible.

**Evira's directive N:o 16024/1** (The most important concerning this research)

(An interview with a vet, Suominen, 30.3.2012)



## **6.2 Quality Policy**

Quality management issues had a huge part in the thesis theory. It was also very obvious to work out them widely in the research part too. A huge amount of information was gathered and it seems that Saarioinen is handling the company's quality policy on a very good level. Based on the information and to the current situation, no improvement ideas was brought up from quality management area.

### **6.2.1 Quality department of Saarioinen Jyväskylä**

As it is well-known, grocery industry is very strict when it comes to rules, regulations, procedures and criterias. They should be followed as they are meant and the reason is obvious, everything is connected to human beings. Consequences can be critical in the worst case scenario, if things have not been done correctly. A radical example could be Bovine Spongiform Encephalopathy (BSE), which is commonly known as mad cow disease (can be even fatal eventually). It is prevented to spread to the humans by taking a lot of samples and tests form the animals that arrive to the factory. Many of this kind of actions are not made only because of the quality politics, but they are ordered by law.

Quality department has to take several different samples (products, structures and environment), which are based on legal regulations and to the self monitoring directions. All the analyzed results will be put to LIMS, which is a laboratory program. The taken samples consist of:

- Purity of surfaces (constructions, machines, mullahs, pools, boxes, tools etc)
- Salmonella samples in slaughter house (carcass surfaces, lymph glands), in cutting departments, in by-product department from constructions and from exported meat
- BSE (every single cow over 72 months old), trichina (every single pig), cooking tests, medicine residues
- Manure samples, normal water and sewage water samples, air samples, mullah washer samples
- Rejection of pests
- Instinct based analyses (present products)
- Microbiological investigations from extractive industry level and from last day of usage level, keeping of novelty products
- Handling of reclamations

These actions are made by Saarioinen Jyväskylä itself (trichina, pH and cooking tests), but outside help is needed also, e.g. laboratory of Jyväskylä city. Directions are developed all the time, so they could be improved to a better and better level. Self monitoring is followed and audited, so it can be ensured that everything will be done correctly, meaning the functions and recordings made. Production hygiene and cleaning work are important issues in the grocery industry, so they are very closely supervised. Consolidated corporation matters are one part in quality management and the main goal is to standardize the instructions, meaning that from separated instructions will be gathered one common plan for the whole Saarioinen Group.

### 6.2.2 Self-monitoring plan and self-monitoring

Self-monitoring plan is an important matter at Saarioinen Jyväskylä and it helps to follow the instructions related to self-monitoring itself. The plan is based on surveying the dangers and risks with the help of HACCP principle, where HA stands for hazard analysis and CCP stands for critical control point. The most important risks are under investigation and control, which are e.g. temperatures and shelf lives. Obviously these are not the only issues to be concerned, but all the functions, goods receiving control, the hygiene of the staff, waste management, cleaning and pest control should be covered by the plan.

When talking about self-monitoring, it is not just some regulations made by Saarioinen. All those rules are coming from the legislation of EU or from the Finnish national legislation. Surveillance was earlier made by authorities but nowadays the focus has turned to self monitoring. In self-monitoring phase, Saarioinen has to clarify the risks of groceries related to its operations. They also need to do other actions such as making a plan to control those risks, execute the monitoring program in a daily basis and evaluate the workability of the system during certain intervals.

Self monitoring has been taken seriously at Saarioinen Jyväskylä and it has been implemented that way. Since this industry is about groceries, which will end up to the humans, the actions are concerned to be done properly. The primary matter in self-monitoring is to make sure that all the products offered by Saarioinen, are completely safe to use.

This leads to a point that every single monitoring and inspection will be made by following the rules. If there will be any deviation found in the monitored results, they will be reacted straight away by announcing them to the foremen. All the results will be put on record, not beforehand or after the shift, but straight away. There is a motto that they use at Saarioinen, which reflects that self-monitoring is serious business: *“What has not been put on record, it has not been done”*.

### 6.2.3 Product quality issues

Product quality is obviously a very important matter for Saarioinen. The competition is very hard, since there are also other huge grocery companies in Finland, which are trying to win customers of from the competitors. According to an interview of Chunk department's production planner there are certain level of quality, which should be reached but there is no need to go too much above. The reason for that are simply the costs and the costs will be increased if unnecessary work will be done and it will raise the quality. Also one thing to remember and should be known by the employees is what kind of meat will be used to produce a certain product. There are so many different assortments in Saarioinen raw materials and employees have a huge responsibility when using those raw materials, since they should be used as effective and efficiently as possible.

At the moment Saarioinen Jyväskylä is trying to control and monitor stay on times for the raw material. In other words it means that they are trying to get the approximate times of how long raw materials will stay in their storages. Other issues under surveillance are keeping times. It can be monitored only by taking samples and following how many days it takes for different assortments to get spoiled. This kind of tests will give the answer for how long are the maximum times for the raw material to be kept in production circulation.

The longer raw materials will be kept in production, the less is the quality. The issues that are causing this fact are the drying of raw materials, the longer they are in mullahs, boxes and pools, the dryer the meat will get. E.g. if some assortments will stay in a pool for 3 days, it will lose a lot of fluids, which will lead to the drying. Other thing that will be caused by too long keeping time in production is simply, that useful life of those raw materials. When the useful life for Saarioinen is getting shorter, it will cut the useful life for internal customers, retailers etc and that is not definitely a good thing.

When it comes to the useful lifetime, it has a huge impact to the rivalry. If you have a grocery company, which offers products and they have approximately the same quality as competitor products, but the difference occurs in useful lifetimes. What would you do as a retailer, if there would be for example couple of days difference in useful product lifetimes? It can be thought with the common sense that the retailer would choose the products with longer lifetime, which can be compared straight to the selling time. Shorter selling times have as for an impact to the monetary issues, since the products cannot be sold after the last day of usage anymore. In other words can be said, the longer the useful lifetimes are, the better the quality, which will lead to better incomes for the grocery company and for the customers also. This is something that gives value, respect and good reputation for the company, which will help the grocery firm to keep their customers instead that they would turn to their competitors.

One reasonable way to compete with the rivalries is for example spot checks. Saarioinen have certain people, who are dealing with the product development etc duties and they are making spot checks to their rivalries products. When making this kind of competitor monitoring, similar products as Saarioinen have in its portfolio, have to be bought. The tests are practically instinct based tests, which mean taste, smell, outlooks and texture. A mentionable thing about the competitor monitoring can be a product called raw sausages. Saarioinen launched the product over a year ago and they were trendsetters in that particular area. After Saarioinen launched the product, other big grocery companies took raw sausages to their portfolio also. Saarioinen decided to examine rivalries products and for example HK was not able to offer the same quality (according to Halttunen) as Saarioinen. Nowadays the gap has been narrowed, but obviously Saarioinen still have advantage, since they have established themselves as raw sausage producer. Cold cuts can be mentioned also about the important products that can be very well compared by instincts. If a person goes to store to buy a packet of cold cut and there are two products made by two huge producers, how can it be decided what to take if the price is almost the same?

Of course by looking the outlooks first, all the other instinct based matters can be estimated after buying the products though. When buying products from different producers, many people will eventually find a favorite one by comparing the products and that may lead to a situation where the same producer's product will be chose next time again. These are the reasons why quality issues have to be clarified and they should be followed as well as possible.

### **Influence of the new slaughterhouse**

Saarioinen Jyväskylä personnel, who are in a position to make decision, had a vision some years ago about to revise functions concerning their slaughterhouse. Of course it took a while to think more precisely what should be done and the planning took a while. The revising actions were made approximately few years ago and it has come out to be a good choice. Saarioinen has gained a lot of advantages when it comes to the quality issues, but also their operations have turned more efficient direction.

First of all, one really important achievement which came along with the new conditions of the new slaughterhouse, is that the hygiene level is much better nowadays. That can be seen from the environment and from the constructions, Saarioinen is taking samples and they will be analyzed in laboratory, so these actions are done in a right way how they should be done. Also one matter affecting to the hygiene is, that the cows and pigs has been separated from each other and they are slaughtered separated. It is very important, since now they are not mixed with each other and possible conflicts between cows and pigs are avoided. As a notation, if the animals would be in the same place, they might have the foregoing conflicts, which would make them quite stressed and that would eventually affect to the quality of their meat. That would not be a good thing when trying to get the best possible quality.

Another considerable improvement is the barn conditions, they have got better during the years and obviously it has an impact to the animals, via that also to the quality of meat again.

According to the interview with a person from the quality department (Halttunen), some new methods and devices have been influencing to the quality in a positive way. For example the stunning method for the pigs in the recent years was electric power. It was not that good solution, since pigs got electric shocks during the operation, so it was less discreet method and had influence in quality. Nowadays the stunning operation is made by using carbon dioxide, which is way much better option for the quality and for the pigs also. If thinking about the quality issues, carbon dioxide method affects straight to the quality of the meat. Haematomas, which are definitely not a good thing, have almost fully disappeared → production efficiency has been improved a lot (the meat can be used to the better assortment, because the quality is in a correct level) → remarkable monetary issue by the better usage of the meat.

Some devices are different when slaughtering cows and pigs. There were mentioned very good improvements and their affection to the quality of pork meat, but there is at least one mentionable device for the cows, which affects to the meat quality. This device is kind of a machine, which is used to pull the pelt off from the cows. When the cow has been slaughtered, this device pulls the pelt off and it has to be decent for the usage, so that the pelt would come off smoothly. When the pelt can be pulled off smoothly, the spine won't be cracked and it affects especially to the quality of sirloin and tenderloin. This problem was real few years ago but at the moment they are having a good device in use. All this can be demonstrated simply by checking the prices for sirloin and tenderloin. The price for sirloin is approximately 30 Euros per kilogram and for tenderloin it is over 40 Euros per kilogram. These facts discussed above have again an impact to Saarioinen and to their customers, both in quality and in monetary issues.

## **Operational system at Saarioinen 2012**

There are few different systems that are used at Saarioinen. These systems, which will be mentioned below and explained also shortly, are the systems that belongs to Saarioinen ´s operational system in 2012.

- Quality system ISO 9001 (based on customer matters and operational processes)
- Environmental system ISO 14000 (based on environmental issues and to the environmental program)
- Self monitoring system (based on law, based on HACCP and it is also a supporting system for everything else)
- Grocery safety system ISO 22000 (based on consumer matters and product matters, based on HACCP and it will be also a supporting system for everything else)  
 → ISO 22000 is still under development and Saarioinen is auditing it. It will come over these other systems they are using, so it is not blocking anything out but supporting everything else.

## **6.3 Production at Saarioinen Jyväskylä**

When considering the issues what should be investigated during the research, these forthcoming ones were picked. The reason to choose these, was that all these functions are affecting strongly to Saarioinen Jyväskylä´s performance on a daily basis.

### **6.3.1 Production Planning**

Production planning has been divided at Saarioinen Jyväskylä. Chunk meat department has its own production planner, who is in charge of planning all the production that happens there after he has got the sales figures from the marketing department. All this happens within certain timelines. Saarioinen Jyväskylä has 3 different sales periods, which are 4 months long, during one year. The production planner concentrates to the period, which is in progress at the time, meaning that even he have planned the production for one whole period, he needs to make plans also monthly and even weekly.



Sometimes there can be situations that plans need to be done in a daily bases, so it requires good communication with the other production departments (pork cutting and cow cutting). Flexibility and responsiveness are also key words when actions have to be done quickly.

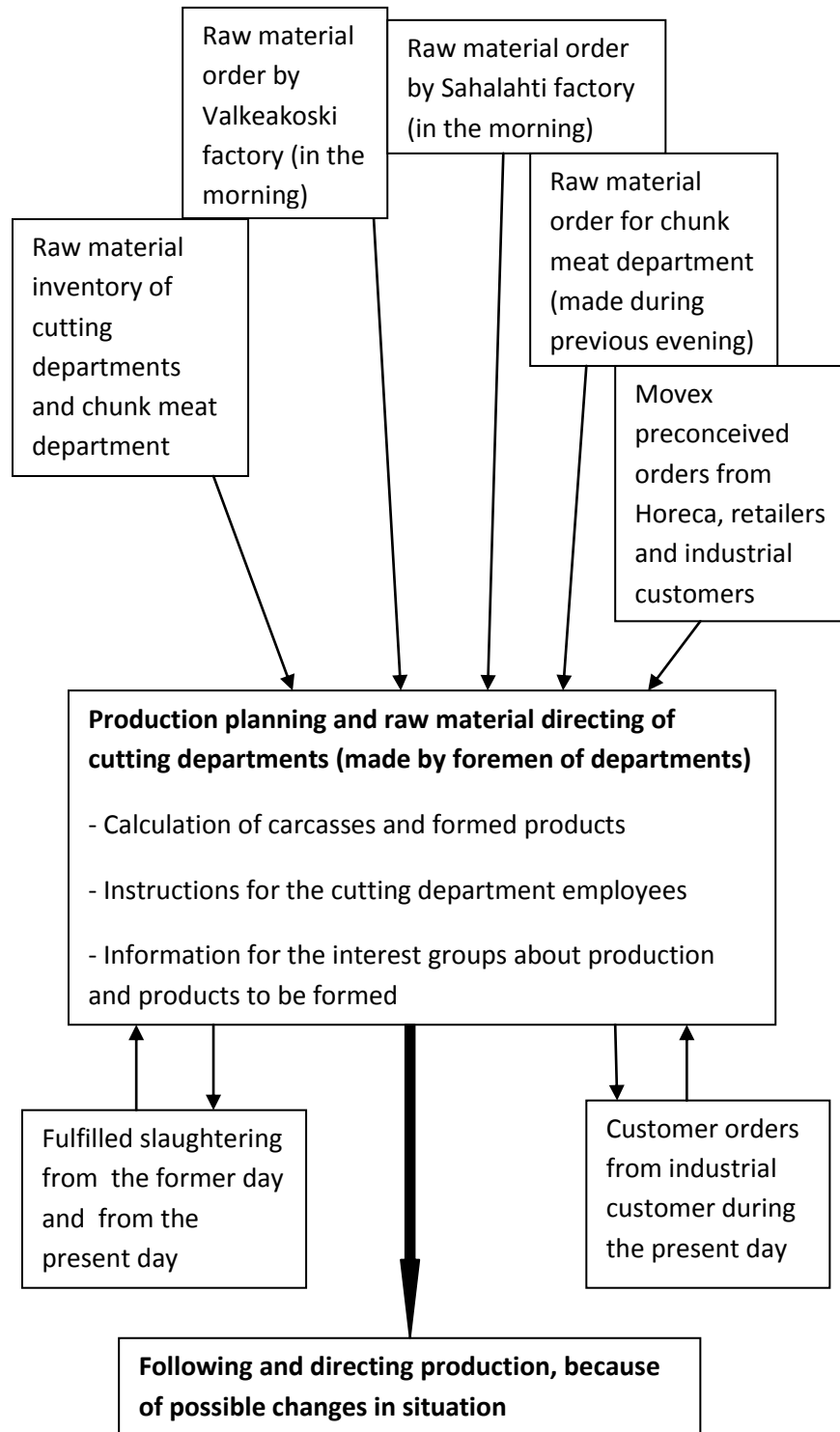
From chunk meat department there is practically 2 different destinations, meaning customers, for the products. Those customers are retailers and Horeca (catering/restaurant services). Production for the customers has been divided so, that during the morning time the products for the retailers will be produced and during the evening time Horeca's products will be produced. This has been enabled because employees are working in 2 shifts in the chunk meat department.

Production planner needs to be aware of what happens and when does it happen, since there is a possibility that situations will change even in a daily basis. The reason is that the production planner have the lists, which tells about the products needed for the retailers and for Horeca and he needs to order them from the other departments, meaning there are different meat cutting recipes. In other words the meat will be cut in the way it needs to be cut, so it is usable for different purposes. Sometimes when it is not possible to have all the meat as fresh, the production planner have order them from Saarioinen frozen storage (safety stock). The problematic matter here is that the warehouse location is in Seinäjoki, so it takes some time before the meat will arrive and before using the meat, it needs to be defrosted naturally. Defrosting takes time 1-2 days, so all this means that the production planner have to react to the changes beforehand.

According to the interview of the production planner, they will have the consumption plans every Thursday for the next week. When they have had the plans, the ordering process will start. The first choice is to order it from the production departments and like mentioned above, if needed, then from the frozen storage. All these functions are much easier to perform, since they have computerized production planning program at Saarioinen. Storing and sales are included to the program, so all the sudden changes are also possible to accomplish if needed.

Those other departments, pork cutting and cow cutting departments, which were already mentioned above, does not have so called production planner at all. Plans are made by the foremen of the departments based to the needs of the internal customers, which are Sahalahti factory and Valkeakoski factory and to the needs of chunk meat department. Both internal customers and the chunk meat department have different needs, so that gives better chance to accomplish the orders every day. Internal customer are always handled first, in other words the amount needed for them will be produced straight away when the working day starts. That is a way to make sure that they will get everything they have ordered. Sometimes when a situation exists, that meat cutting departments cannot produce the needed amounts, the frozen storage comes to the picture. It was mentioned earlier that it can be used by chunk meat department, but it can be used also for the internal customers if needed. In that kind of situations, the foremen have to be proactive and they need to have responsiveness and flexibility.

It will be demonstrated in the next figure, that how much responsibility foremen of cutting departments are facing within the whole production process. Like it can be seen, they are basically in the middle of everything.



**FIGURE 6. Daily production planning and directing**

### 6.3.2 Material Flow Process

If thinking about the material flow process, Saarioinen Jyväskylä has a clear picture about how it should go. First of all, if an animal will be slaughtered today, it should be moving to the customer already tomorrow. The reason is that it is a waste of time, which means waste of money for the company when meat is lying on mullahs and plastic pools. Good example to clarify this situation is to think about if meat has been in a mullah for 3 days. It was weighted in a day when it came from production and it had certain weight at that time. Now when it has stayed in storage for few days, it has lost a lot of weight because it has lost a lot of fluids. This is connected straight to the loss of profits, since the fluid weight will be lost when weighting the meat again before sending it to the customer. Another matter, which supports the idea of fast material flow, is the fact that every day when meat is staying in the factory, will decrease its life of usage.

That kind of situation, that there would be 3 days old meat in storages, is not common at Saarioinen. Usually material flow has been pretty smooth and most of the products will be sent towards when it is wanted, but sometimes something unexpected can happen. One good example would be, that here are many different assortments, which will go through the packing department and if even 1-2 of the employees are having a vacation or sick leave, it is going to affect to material flow a lot. Of course this kind of situation can be solved somehow, but the question is that how profitable it will be?

There are practically two options, to take employees from other departments (if it is possible) or ask packing department employees to stay overtime. Both options are very bad, since many times the only option, when taking an employee from other department, is to take a meat cutter. Meat cutter's earnings are approximately 4-5 Euros more per hour than packer's and they cannot do the job as fast as a packer. This will obviously create unnecessary costs for the company. Overtime work in the other hand will also create a lot of costs, since first 2 hours will be 1,5 times the salary that packer gets normally per hour and after 2 hours it will be 2 times the normal salary. An example about the overtime costs can be given, but in this case it will be fictional calculation, because the amount of overtime work fluctuates so much.

### **An example about overtime costs (fictional):**

Approximate overtime working hours per week: 5

Number of working employees: 2

Normal salary per hour: app. 16 Euros

First 2 hours are raised 50% and all the next hours 100%, so when those 2 employees are working overtime 5 hours per week, it means:

$$16 \text{ Euros} \times 1,5 \times 2 \text{ hours} + 16 \text{ Euros} \times 2 \times 3 \text{ hours} \times 2 \text{ employees} \\ = 288 \text{ Euros per week}$$

So overtime costs are 288 Euros per one week in this case. If in one year there is 50 working weeks, then:

$$288 \text{ Euros per week} \times 50 \text{ weeks} = 14\,400 \text{ Euros per year}$$

This fictional calculation clarifies that if these would be the numbers for employees, working hours and wages, overtime costs during one year would be 14 400 Euros.

Another problem could be faced by putting a meat cutter to the packing job. It comes out when calculating alternative cost for the job, the fact that the salary is bigger for a meat cutter, the speed of work is slower (approximately 2/3 from a packer speed) and the loss which comes from the fact that person is not doing the job he is supposed to do.

Those were couple of examples about the problems when it comes to material flow, but they are not certainly the only ones. There are many different variables, which will affect to the material flow and especially this are of business cannot be controlled totally. Sometimes there may be a situation that purchases does not go how it has been wanted in production and then the end result is either overproduction or there will be less raw materials than needed. Overproduction is especially harmful for material flow, because it can cause very bad backlogs.

E.g. what happens if all the cutting departments are full of meat cutter and there are couple of sick leaves in packing department? It will inevitably lead to a situation where overtime hours are needed in packing department (costs), storages will be jammed (raw materials are harder to find, which takes time so costs) and packers cannot pack everything during wanted time, so meat will lay in those mullahs and pools longer than wanted (costs).

### **6.3.3 Warehousing Logistics**

During this research it has become more and more clarified that Saarioinen Jyväskylä's warehousing facilities are not adequate at all. Storages are way too small to the needed purposes and if there are days or even weeks, when raw material flow is very high, there will be ongoing small chaos. Many times there has been a situation that mullahs, boxes and pools have been all over the passages, which is definitely not the ideal situation. It will create unnecessary traffic jam, because people are carrying different kind of receptacles across the passages, which are very narrow already. Of course there is very difficult to find a solution, because Saarioinen's facilities are very old and there are not more space in the factory as there is.

This present situation creates a lot of problems in the factory. Traffic jams are everyday life, employees may have problems to find different assortments from the storages if they are full and negligently fulfilled. Raw materials in the passage floors are also a huge problem, since they should not be there. Packing department people are basically responsible to move them from a place to another, in other words, unnecessary waste of time, movement in the passages and all this costs money to the factory. According to a small interview of an employee from packing department, if there are a lot of raw material in the storages and passages are jammed, it may even take time totally worth of one employee's working day to find the right assortments. It is a huge loss of money for the factory and it would be really desirable to find a solution for this problem.

After investigating and checking out the layout of Saarioinen Jyväskylä, there might be a solution, which would ease to smooth these problems, but in best case even sort it out. It will be discussed more closely in my improvement section of the final thesis. There will be the old layout and the new suggested layout to demonstrate the changes, which could help in sorting these problems.

It is very difficult to estimate, that how long it will take time to search the right assortment on a daily basis, but here will be a fictional calculation about it. In this case, the approximate time wasted by every single employee in the packing department is not much, but will still give a slight picture about the costs. One thing need to be remembered, that the time can be much more, than in this example. The reason is that the employees need to be sure that they have taken the meat container, where the useful lifetime is the furthest.

**The calculation (fictional) about the possible costs:**

Total amount of personnel in packing department: 6

Salary per hour per person: app. 16 Euros \* 1,75 (social costs)

Imaginary waste of time per person (daily): 20 minutes

Workdays per one week: 5

Workweeks per one year: 50

$$6 \times 20 \text{ minutes} \times 16 \times 1,75 \text{ Euros} = 56 \text{ Euros per day}$$

$$56 \text{ Euros per day} \times 5 \text{ days per one week} = 280 \text{ Euros per one week}$$

$$280 \text{ Euros per one week} \times 50 \text{ weeks per year} = 14\,000 \text{ Euros per year}$$

The calculation shows, that even the time would be that small on a daily basis, the costs are still 4000 Euros per year. As a notation can be said, that it is not only the personnel of packing department, who have to find the raw material from different storages. There are also personnel from the standardization department and also from the chunk meat department, so it is more than probable that the costs per year are much more than in this example.

### **Safety Stock (frozen storage)**

Saarioinen Jyväskylä is having its frozen storage in Seinäjoki. The deal consists of 1000 frames, but there have been times when Saarioinen have had to negotiate about more space, meaning that the 1000 frames is the constant contract and if they need more space for their raw materials, separate negotiations are needed then. There are few reasons for choosing Seinäjoki as a location. One is that the warehouse there happens to be one of the biggest frozen storages in Finland. In that way it suits very well for the Saarioinen purposes and one supporting matter is also that some huge rivalries use the same facilities too. Other reasons are that Saarioinen had earlier all their frozen material in a warehouse, which is located in Lempäälä, but there was so many problems in operations that Saarioinen had to change the facilities. E.g. warehouse control was very poor and it came out in a form of inventory problems. All this led to a situation that raw materials were missing, amount of meat did not match and useful lifetimes were surpassed.

Before Lempäälä warehouse, Saarioinen had an ideal situation, when it comes to the frozen storing. They had a deal with Valio, which is located approximately half a kilometer away from Jyväskylä factory. It meant that Saarioinen was able to make several shipments on a daily basis and the distance was unsubstantial, comparing to the fact that now the distance from Jyväskylä to Seinäjoki is approximately 200 kilometers. The reason why Saarioinen had to give up the storing space at Valio, was that Valio does not have it anymore, because they changed it for totally different use. Consequently Saarioinen was forced to find some other location for their purposes.



In a way it may sound reasonable to have the safety stock location in Seinäjoki, since everything is going well there and also some biggest rivals are also using the services there. It does not still mean that it would be the best possible option for Saarioinen Jyväskylä purposes. Maybe a re-consideration and plotting for new locations could be possible and even reasonable. If there might be a chance to change the location to another and it would decrease the costs, it should be done. That is why Saarioinen Jyväskylä personnel should check out all the possibilities and try to find another solution, which could decrease the distances and at the same time decrease the transportation costs. Maybe there could be even a possibility to negotiate a better deal with another warehouse and then it would bring the total costs down from where they are now.

#### **6.3.4 Enterprise Resource Planning**

Pims is an enterprise resource planning system, which is used in Saarioinen factories. Most of the factories have it in use already but at Saarioinen Jyväskylä, the system is still quite new and the implementation is going forward all the time. There are already some functions in use and some functions will be applied during the summer 2012, some during next couple of years. The aim of implementing PIMS is to computerize all the information and at the same time get rid of all the unnecessary paper work.

Those functions that are already in use at Saarioinen Jyväskylä are picking and warehouse bookings for the end products. During the summer there will be added 2 more functions in the system, which are storing and bookings for production. Later on there will still be added more functions to the system, 3 of them are already known and they are raw material purchases, packing materials and self-monitoring. These functions are explained more below.

**Picking:** includes the information about what has been picked and when it has been picked before sending them to the customers.

**Warehouse bookings for the end products:** bookings for the end products including the product name, weight, last possible day of usage and amount of that particular product.

**Storing:** tells the warehouse/storage location of a particular product.

**Bookings for production:** gives the information about which batch has been used in producing some particular products.

**Raw material purchases:** gives the need of a particular raw material for a certain timeline.

**Packing material:** gives the need of a particular packing material for a certain timeline.

**Self monitoring (in the front end):** supervises that the temperatures are correct, instinct based functions, meaning that the meat does not look like rotten or smell like rotten and check weightings.

Even there is a lot of different variables in the system and more functions are coming all the time, the key issue for the system is that every single piece of meat can be followed up. The reason is the fact that it is ordered by the law, so it cannot be rounded, because it would be illegal otherwise. According to all this, everything starts when the animals have been slaughtered.

All the carcasses have to be recorded into PIMS and after that they will be cut into different pieces which are going to form all the assortment groups Saarioinen has in its list. Then those assortments will be sent forward to the most important customers (Valkeakoski and Sahalahti factories), which are the internal customers and to the chunk meat department, from where they are going to be sent to the other customers as Horeca (catering services) and to the different retailers.

Seems that PIMS can be very useful system for Saarioinen and obviously it has been since they are implementing it to all their factories. There are just few questionable things, which should be considered. Why Saarioinen Jyväskylä is implementing it so slowly and only partly if it is a decent enterprise resource planning system? According to the interview, it has been in use in other factories already, so it sounds kind of a weird that they are not implementing all the possible functions at the same time. It would mean that the whole system would be in use straight away, after short period of getting familiarized with it of course. All this rings the bell and makes wonder, if the system is not ready yet and there are weaknesses that needs improvement. In a nutshell, why not take the whole system straight away in use if it is and has been totally workable in the other factories? The theory says though, that ERP systems should be driven in partly, so the possibility for a disaster would be smaller.

One confusing matter, when first heard, was that PIMS should be able to do also all those instinct based functions. After asking questions and investigating it more properly, came out that those functions made by PIMS, were meant to happen in the front end of the whole process. According to the interviews, it is still a manually performed function to smell and look the raw materials and make the judgement about whether they are usable or not. It makes totally sense, because it would sound more like weird to think that a machine could smell or see that kind of things. With manually based monitoring, Saarioinen ensures that everything will be properly tested and huge disasters can be avoided in the form of big batches of spoiled meat going through to the customers.

After gathering all the information and thinking about the system's characteristics, it seems that PIMS is and will be very useful system for Saarioinen. All the functions that are included to the system, will ease the information flow, decreases the waste of man hours and will also erase unnecessary paper work. Only thing I would like to suggest, would be that instinct based functions should be still kept manually handled and no changes to that would not be even considered. It would not increase man hours that much, probably not at all and it would make sure that disasters would not happen because of malfunctions of the system.

## **7 IMPROVEMENT IDEAS**

### **7.1 New layouts for storing**

Storing arrangements have been problematic for Saarioinen, so that was the reason to give them attention during the research. After thinking the material flow inside the factory and trying to find a reasonable solution for the operations, three new and different solutions came up. All the three solutions will be shown as handmade drawings, but they will be put into attachments, because the layouts are secret documents and not allowed for the public. In addition, there will be also the original layout in the attachments, so it can be compared to the new solutions. This is how everything can be evaluated and considered properly, whether any of those new solutions could be useful for Saarioinen Jyväskylä in the future.

Like it can be seen from the layouts, option A would be the best one to choose as a new layout for the storing. Option C could also a possibility, but after thinking it through, option A would be the best one, because material flow and arrangement would be the best in that solution.

### **7.2 Bar code technique**

Bar code technique enables data transferring without mistakes. Bar codes are very simple to use and they have been discovered reliable in use. Different types of bar codes are several and they are standardized. Those types are for example EAN, Interleaved 2/5, Code 39, Code 128 and Data Matrix. Every single of them have their own usage area, depending on the purpose of use.

The bar code system can be either open or closed, depending on how it needs to be used. If bar codes are used only in company's own applications, internally exploited, then we are talking about closed system and the type and contents can be chosen freely. If bar codes are used externally, e.g. with the suppliers, the standards in the field of business should be discovered.

Grocery industry and retailers are using bar codes, because it is simple to use and they are an essential part (production, warehousing/storing, transportation) of a supply chain. In addition, bar codes are used also in health care, laboratories and authority applications. Benefits of bar codes are listed next:

- Simple and quick
- No writing and reading mistakes
- Standardized
- Increase productivity
- Cheap to use.

It is already clear that Saarioinen is using bar code technique in its operations. At Saarioinen Jyväskylä, it is located basically to the department where the outgoing products are handled. A suggestion would be to increase the usage of bar codes in the factory. It could be reasonable especially when thinking about the animals that are coming in. After they have been slaughtered, it would be a good choice to burn the bar code to the side of carcasses, this would happen in the slaughterhouse after the slaughtering operation. I have heard that there might be some kind of laser bar code marker available. It could be very handy, because if the bar codes would be burned in the side of carcasses, they would stand all the functions (cold and hot handlings) happening before they end up to carcass storages.

When the carcass man would get them one by one, he could just read the code with a reader and all the information would be stored to the computerized system. This would save time and money in many ways, if comparing to the present system. At the moment the carcass guy racks up notes, which are hanging from the carcasses. The notes tell the carcass number, weight, slaughtering date etc. Then he marks some details to a notebook and that notebook will be used later when someone is marking the details up and calculating the average weight of the animals. The average weight is straight comparable to the salary of the day.

One possible problem could also be that the notes can be lost during the functions, so how to identify that particular carcass, if the note would have been lost before the carcass arrives to the carcass storage.

All these problems could be solved by using bar code technique. Carcasses would have been marked already before they leave the slaughterhouse, carcass man could just read the code and put carcasses towards without unnecessary notebook markings, since the details would be sent straight to the computer system. Also time would be saved, because one employee would not have to calculate the average weight anymore. The computer would do it automatically without forgetting the possibility in human errors if calculating everything manually.

### **7.3 Further Research**

In further research section the idea is to give something to think about for Saarioinen personnel. These suggestions are the kind of matters, which will need a lot of time and consideration before even thinking of implementing them. In other words, they are something to work with in the future and they probably should be investigated carefully, because the advantage gained could be remarkable.

#### **Possibility to affect in natural breeding circulation of pigs**

While doing the final thesis to Saarioinen Jyväskylä, a drawback about optimization of raw material flow (in this case, pigs) came out for real. It has been a huge problem for them to divide the flow into periods, meaning the flow is more like irregular. There can be some periods, when raw materials, even they would not be needed at that time, are coming to the factory and when they really are needed (especially summer time), Saarioinen is facing a problem in the form of low-level supply. It has been quite difficult to think any solutions for that issue, since according to the interview of production manager, it is not possible to control the flow. The claim is based on to natural breeding circulation of pigs. In other words, this means that sows have certain periods when they are having their heat time. All this is controlled by seasonal matters.

A solution for this kind of problem would be valuable for Saarioinen and it took a while to think about it. There is no certainty that the problem could be solved, but at least when searching some information about the facts, I found an interesting article about pig pasturage (Breeding of pigs).

It tells about Hanna Hemilä and Timo Hemilä, who have been executing a kind of light program for the pigs. In a nutshell the idea of this program is to affect to gestation of sows by bluffing them to think that there won't be summertime at all. It is very important for the breeding of sows, that there is both, bright and dark time during every 24 hours. During summer- and wintertime there are issues, which need to be considered, but with a couple of practical tricks, they can be solved. When wintertime is going on, there has to be extra light in the piggery and in proportion when summertime is affecting, plywood plates need to be used to block the unnecessary light. These are tricks basically, what to use when controlling the breeding of sows.

The article does not say what kind of light should be used, when using the light program. It also does not say, that is it possible to control the breeding times completely, but my suggestion is that Saarioinen Jyväskylä should consider this matter seriously and maybe even try to find out whether this program is usable in much bigger scale or not. One important matter to consider is the ethics. If Saarioinen will think that this idea could be worth of trying, the ethics has to be remembered. Without observing ethical matters and executing the program, the consequences can be really bad. In the end it could affect to the business via reputation loss and it would affect straightly to every single party involved in the chain.



## **RFID (Radio Frequency Identification)**

When doing the research, it came out that one solution for Saarioinen when improving their technology, could be RFID. The solution could be useful, when identifying the carcasses but the challenge they would face eventually is, that the identification would get very difficult when the carcasses will be cut in pieces.

In other words it would be almost impossible to know where different meats from carcasses are going at some point of time, since there are a lot of meat assortments and for example in one mullah can be put approximately 200 kilograms of raw materials. This means that the amount consists from many different carcasses and also as said, they are already in pieces, so tracking down would be unnecessarily difficult.

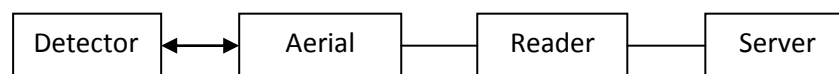
If thinking of RFID and what is it about. It is an automatic identification system, which is based on radio frequency. With the system different materials can be tracked down but pinpointing them is impossible, meaning that e.g. at Saarioinen Jyväskylä factory a certain mullah of meat could be tracked down to a certain storage and also an area could be defined there but it could not be totally pinpointed where it is.

One occupying question, when considering RFID and its implementation, could be why to do it. The purpose of use and possible advantages and disadvantages should be thought through and the decisions should be made based on that. Like said, advantages change between different purposes of use, but many times, genuine benefits in business could be achieved. As a notation, payback times should be counted beforehand and they usually are counted before implementing the system. Couple of more advocates for the RFID system could be, that nowadays new operation environments are possible to use, such as metal (during recent years it was not possible or at least it was very difficult environment, because the device had problems in reading the identities). Other one would be the fact that RFID readers have been developed and they are not that expensive anymore, also the cheapest detectors cost less than 10 cents anymore.

Here are some mentioned benefits when using RFID:

- Saving of working time
- Lower transaction costs
- Automation of functions
- Increased reliability
- Follow-up and monitoring
- Decreased error costs
- Product specification
- Many others.

A suggestion, when thinking of implementing an RFID system, would be that everything should be considered through carefully. All possible advantages should be listed and then compared to the calculations of costs and payback time. Technology develops very fast and that is why the costs and useful life for the system should be investigated. After that the possible implementation of a system can be justified or not. When thinking about the fact, that this industry is about scattering the carcasses and then in some cases, putting them together again, tracking down turns almost impossible at some point. In my opinion this is the reason why Saarionen Jyväskylä should investigate the possibility of RFID usage in the end part of the production. After the raw materials and products would have been packed, detectors could be put to the boxes and conveyors. This is how they could be followed-up until the final destination is obtained. Probably this could be an idea worth of considering in gaining some advantages mentioned in the list above.



**FIGURE 7. RFID solution, its basic components and functions**

Detector: Consists of aerial and memory chip. 96-512 bits. RF passes information from the detector to the aerial. Either active or passive. Reading detectors or reading and writing detectors.

Aerial: Receives and sends electromagnetic waves. Wireless data transfer.

Reader: Communicates with the detector via aerial. Receives commands from the application software. Convert radio waves to digital information. Gives power to the passive detectors via aerial.

Server: Writes and reads detector's data via reader. Filters, stores and handles gained information. Searches and passes information to the backing systems e.g. ERP, WMS.

## 8 CONCLUSION AND CRITICAL ASPECTS

The idea about the subject of the final thesis was formed in the beginning of year 2011. I decided to ask the possibility for this work from Saarioinen, since it felt reasonable after working there several summers before. Luckily they had the idea about improving certain parts concerning their operations. The thesis was revised during the research, because it would have been quite difficult to explore a subject, which improvement is just coming later in the future.

Regardless of this, an interesting ensemble was found and it will be very suitable proof about expertise for a forthcoming logistics engineer.

Main issues in this thesis involved some parts from supply chain, some parts from quality management and some parts from production and they were also discussed about in the research part of the thesis. Based on the research, some improvement ideas were suggested and some further research ideas were brought up to the deeper exploring. Also a lot of theory was gathered in the theory part of the thesis, but it would have been impossible to discuss about every single included subject. The theory part will be a valuable tool for Saarioinen to analyze the workability of their operations and it will give some basis to the right direction, if improvements will be implemented in the future.

If thinking about the whole research process, it would have been better to have much more time to do the work, since the area I worked with, was so wide. Of course there could have been moments, when I could have been more efficient and effective. Generally, the time compared to the area wideness gave a lot of challenge during this project and the success that was achieved, can be thought more than positive. There was times, when the project was stuck and new aspects were difficult to find, but they were overcome and some improvement ideas were found, which is something to be satisfied.

Even there are suggestions about improvement ideas and ideas for further research, it does not evidentially mean that they would be correct and the best ones. They are just suggestions considered from objective point of view. My opinion is that Saarioinen personnel should check out the ideas and then analyze, whether they would be worth of implementing, because benefits cannot be gained without executing.

As a whole, the process was a challenge and educational. I was privileged to work with issues, which are not that usual when thinking about the work of a logistics engineer. It gave me good perspective about the complex operations in grocery industry and I believe it will help me in the future, when working for some company. The work itself was completed just in time and the set objectives were fulfilled.

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## ATTACHMENTS